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FREDERICK JEFFERSON CERMAK.

The subject of this sketch was born in Cleveland, O., September 18, 1880. His parents came from Bohemia when both were small children. He received his early education in the Cleveland schools and his professional education in the Cleveland School of Pharmacy during the years when Dr. H. V. Arny and Dr. R. A. Hatcher were members of its teaching staff. In those days students of the School of Pharmacy served apprenticeships in drug stores where they earned their tuition and fees. Mr. Cermak was employed by G. L. Hechler, the first Cleveland member of the Ohio Board of Pharmacy, who was appointed in 1888. The first Board was established by law in 1884. While in school he transferred his apprenticeship to the store of his uncle, Otto Zickes. His uncle opened another store in 1903 which Mr. Cermak later took over. This store was located in a little frame building on Ninety-third Street next door to the corner of Union Avenue where the present store is housed in a modern brick building. The present store which Mr. Cermak has conducted in this one location for thirty-six years is known in the neighborhood as one which specializes in prescriptions and professional service. He graduated in June and became a registered pharmacist in November, 1903.

In 1910, Mr. Cermak and Mr. Zickes bought May's Drug Store, Ontario Street and Euclid Avenue, the only store downtown, at that time kept open night and day. Mr. Cermak later bought his uncle's share and operated the store for thirteen years. Mr. Cermak has owned a number of other stores and in most instances disposed of them to former clerks and apprentices of his own. He takes much pride in being of aid to men loyal to him and in helping them become established in businesses of their own. One of these ventures was a store which he bought and sold to his first clerk, Mr. Harry Ackerman. The Eagle Pharmacy where he served his first apprenticeship, he bought and sold to another clerk, Mr. Joseph Kopecny; another to Mr. Edward Votypka; another which he opened in Lakewood was taken over and operated by two of his clerks, Rieman and Spear, and finally sold to his clerk, Ludvik Letak. His brother has clerked for him in his present store for twenty years and William Harrington has been with him for twenty-eight years. Both are registered pharmacists.

Among activities outside of the drug business, he has served as President of the Associated Savings and Loan Company, which he helped organize in 1920 and because of his energy and integrity many of his friends and neighbors in his community are grateful to him for the protection of their life-time savings. He is now President of the Woodland Hills Merchants Association which he helped organize, a group that attracts more than thirty thousand people, by actual count, to its annual picnic outing.

Mr. Cermak is a member of the Northern Ohio Druggists Association, having served as its President in 1926, is a member of its Board of Control now, and has been appointed delegate to and attended since 1919 most of the conventions of the National Association of Retail Druggists. He has served as member of the School of Pharmacy of Western Reserve University Advisory Board, helped organize the Academy of Pharmacy which includes the Local Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION and served as its president in 1937, and as a member and chairman of many committees. He has attended many of the conventions of the AMERICAN PHARMACEUTICAL ASSOCIATION and has taken a keen and intelligent interest in its proceedings. He is a member of the Ohio State Pharmaceutical Association.

Mr. Cermak was married in 1918 and he and his good wife, Rose, have two children of whom they are justly quite proud, the son attending Western Reserve Academy at Hudson, Ohio, where he is preparing for the future study of Pharmacy, and the daughter attending Mather College of Western Reserve University. Mrs Cermak is a real helpmeet to her husband and is interested in his work as well as her own civic and social activities. She served as president of the local and then as president in 1927–1928 of the Women's Organization of the National Association of Retail Druggists.

Mr. Cermak is intensely interested in Pharmacy and its organizations and like all busy men is always ready to lend a hand in helping to accomplish something for Pharmacy. He is a retail druggist to whom we can point with pride, not only for his financial success but also for his character and integrity and for the fact that he is a true gentleman. Cleveland is proud of him.

The AMERICAN PHARMACEUTICAL ASSOCIATION has conferred an honor upon itself as well as upon Mr. Cermak by electing him to the position of one of its vice-presidents.—E. S.

DR. R. B. J. STANBURY MEMORIAL HONOR FUND.

The Candian Pharmaceutical Association has invited subscriptions to this fund in honor of the splendid services which Dr. Stanbury gave to Canadian Pharmacy during his services of more than fourteen years as secretary of the Association. President W. B. Mahoney of the Association suggested that a fund be accumulated by voluntary subscription and that the revenue be used to provide an award of a medal, scholarship or prize to perpetuate Dr. Stanbury's memory. Subscriptions may be sent to the Canadian Pharmaceutical Association, 43 Victoria St., Toronto, Ontario.

The members of the A. PH. A. will recall that Dr. Stanbury was a regular visitor during annual meetings and a helpful participant in our programs.

EDITORIAL

E. G. EBERLE, EDITOR EMERITUS. 2215 Constitution Ave., WASHINGTON, D. C.

LOCAL AND STUDENT BRANCHES.

EVERY ONE interested in Pharmacy appreciates that any investment we make in the profession is an investment in our own personal futures. We realize also the necessity of a strong national parent organization if our profession is to become and remain strong and virile. In building up the national organization it is basically important to increase its active membership and to make the members of the profession better acquainted with the program and the work of the ASSOCIATION. Local and Student Branches can be very helpful in promoting both objectives. The increased interest being shown in these local units is very encouraging. Four Student Branches and a Local Branch have been established since the last annual meeting, and several branches have revived and extended their activities. Plans for several additional branches are being carried forward and branches should be established in every locality and school where the conditions will justify.

Another equally important consideration is to hold the ground which we have already gained; in other words to keep our existing branches strong and active. This will necessitate thought and planning and action on the part of our members, especially our branch officers. Our programs must be kept strong and must be widely publicized. Pressure must be brought to bear on certain of our members to attend our meetings until they have established the habit of doing so. When this has been accomplished, we have added new recruits to the band of crusaders who are giving themselves unreservedly to the welfare of Pharmacy.

In spite of requests from the Chairman of the Committee on Local and Student Branches, some of our branches have neglected to send in the names of their officers, others have failed to send reports of their meetings. Although such neglect is the result of carelessness rather than fundamental lack of interest, it is the sort of thing which slowly undermines our branches and eventually leads to loss of ground which we have won with difficulty.

All of its present members must be profoundly appreciative of President Lascoff's efforts to increase the membership of the AMERICAN PHARMACEUTICAL ASSOCIATION. His personal efforts have brought splendid returns. The activities of the membership at large have been less intensive and consequently less fruitful.

Here again the branches have done much and can do more. Their officers and members are acquainted with the conditions and the possibilities in their localities and schools. The Local Branches can interest a greater number of pharmacists in their work by arranging their programs to furnish the desired professional information and discussions.

Very soon Secretary Kelly will be sending greetings and good wishes to the young men and women graduating from our colleges this coming June. This message can be supported by the Student Branches. It would be helpful if our Pharmacy College Deans would speak to their graduates urging them to join the AMERICAN PHARMACEUTICAL ASSOCIATION and play lay their full part in helping to secure the future of our profession. Personal letters from the Deans to each of their graduates should prove even more helpful and effectively pave the way for Dr. Kelly's suggestion.

Strong programs, active committees, in fact well-rounded branch activity is the sort of thing which will not develop of and by itself. It will follow only as a result of proper planning and hard work on the part of you and me. Let us resolve to do better for the balance of the Association year that we have so far done.

Ernest Little, *Chairman Committee on Local and Student Branches.*

THE SPATULA CLUB.

THE EFFORTS being made in many sections of the country to promote closer relations between physicians, pharmacists and dentists are bringing results. These efforts should be continued and extended until the public health professions will coöperate fully in rendering their necessary services.

The results are being brought about in many ways and through many forms of organizations. Pharmacists are leaders in many of these efforts. A large majority of the state pharmaceutical associations now have active fraternal relations committees and they are supported by local committees and organizations. Many of the latter are doing excellent work because in these smaller groups it is possible to promote friendship and coöperation through personal contacts.

The organization named in the title to this comment is a case in point and affords a striking example of what can be done by a small group of pharmacists. The Spatula Club was organized in Pawtucket, R. I., in 1936 to coöperate with the Caduceus Club which is an organization of physicians. Each club has a Committee on Complaints to which any difficulties that may arise between the members are referred as well as any practices that should be initiated, changed or discontinued. The Spatula Club has carried on a campaign of health advertising in the newspapers stressing the necessity for coöperation between the public and the health professions in the control of disease and in the promotion of good health. "Community Health Depends Upon Intelligent Medication," is the theme of the advertising.

The Spatula Club meets about four times per year at a dinner, has only a few rules and no by-laws, and the dues are one dollar per week which also covers the advertising expense. Visits are exchanged with the members of the Caduceus Club each year at a dinner or an outing. The Club is now coöperating with the Dental Club of the city in the same way.

The object of the Spatula Club, as its President expresses it, is to develop better pharmacists, to promote public health and to coöperate with the physicians and the denstists in every way that can be helpful.—E. F. K.

ROUND TABLE DISCUSSION—CONFERENCE OF TEACHERS OF PHARMACOGNOSY AND PHARMACOLOGY.

The round table type of discussion which featured the program of the Conference of Teachers of Pharmacognosy and Pharmacology at last year's meeting in Minneapolis was enthusiastically received and it was resolved to continue that type of program this year.

The topic selected as the general theme for discussion is, "The Aims and Objectives of the Course in Pharmacology (or Pharmacognosy) and How to Attain Them."

Four pharmacologists (Professors: Bliss, Hiner, Dille and Zeigler) will serve as leaders for the first half of the program; and four pharmacognosists (Professors: Gathercoal, Bacon, Schwarz and Justice) will lead the second part of the program. Ample time for general discussion of each section is planned.

In order that everyone may derive as much profit as possible from the free exchange of ideas and viewpoints it is earnestly requested that all planning to attend the Conference should carefully consider the topic set out above and contribute to the discussion.

SECTIONS

BOARD OF REVIEW OF PAPERS (SCIENTIFIC SECTION).—*Chairman*, F. E. Bibbins; H. M. Burlage, W. G. Crockett, E. V. Lynn, C. O. Lee, L. W. Rising, L. W. Rowe, Heber W. Youngken, Ralph E. Terry, Carl J. Klemme.

CULTIVATION OF EPHEDRA SINICA IN SOUTH DAKOTA.*,[1]

BY B. V. CHRISTENSEN[2] AND L. D. HINER.[3]

PART I.

The remarkable advance that ephedrine and its related products has made in the field of therapeutics gives to it a distinct importance that relatively few medicinals have enjoyed. Scarcely known in this country some ten years ago when the U. S. P. X and N. F. V became the official standards, ephedrine products are now so extensively used that it was deemed advisable to admit the alkaloid and two of its salts to the U. S. P. XI, and several preparations of them to the N. F. VI. This final assurance of their therapeutic value makes it imperative that Pharmacy and Medicine be assured of a continuous supply of this drug. The prevailing uncertainties which frequently interfere with supplies of imported drugs have already affected our supplies of ephedra and the distinct benefits to be derived from having a domestic source of supply is being recognized. Experimental cultivation of both indigenous and imported species is being encouraged (1).

Doctor Youngken suggested in one of his recent articles that the present Sino-Japanese trouble would very likely affect our supplies of ephedra. Some effects have already been noticed and these have served as added incentives to continue investigation of ephedra cultivation. Although a few plants have been grown here mainly for specimen purposes, reliable and adequate information is meager. It is believed that this is the original attempt to place Ephedra sinica definitely under cultivation in order to determine its possibilities as a commercial drug crop (2).

A fairly complete account of the introduction of Ephedra sinica into South Dakota was contained in a preliminary report made in 1936 (3). The numerous inquiries which have been received for additional information on this experimental work suggested that a more detailed and complete account of the findings up to date, 1938, might be of interest and value.

I. PROPAGATION METHODS.

Seeds were collected during the years of 1933–1937 inclusive and tests made on the first four lots to determine their percentage of germination.

Seed testing was done in the greenhouse where the seeds were sown in shallow flats filled with rich black loam. The seeds were sown in ten evenly spaced rows, with ten seeds per row and covered to a depth of about one-half inch, by sifting on a mixture of equal parts of sand and soil. The seeds were then wetted down and the flats covered with a glass to hasten germination. Tests were carried out on seeds collected the previous growing season.

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*Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] Abstract of a thesis presented to the Graduate Council, University of Florida, in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

[2] Director, School of Pharmacy, University of Florida.

[3] Professor of Pharmacognosy and Pharmacology, South Dakota State College.

TABLE I.

Collection Date.	Date Planted.	No. of Seeds.	Germinated.	Per Cent.
1933	1934	300	272	90.60
1934	1935	300	239	79.66
1935	1936	300	226	75.30
1936	1937	200	156	78.00
Total Average Germination, 1933–1936				80.64

It may be concluded from this data that Ephedra sinica when grown in South Dakota, produces viable seeds from which it can be successfully propagated. (See Fig. 1.)

These tests, however, having been made under glass, gave no indication of how the seeds would react if sown directly in outdoor plots. Hence, trial plantings were made outside to determine if the seeds would germinate and mature enough in a single season to enable the small seedlings to avoid winter killing. It was desirable also to know how early or late the seeds could be sown with safety. From trial plantings made from 1934 to 1937 the following observations were made:

TABLE II.

Dates Planted.	Germinated.	Estimated Per Cent.	Seedling Report the Next Spring.
3/28/1934	Apr. to June	80	Broadcast plot. Discarded
5/6/1935	5/20/1935	80	Wintered in excellent condition
5/19/1936	6/1/1936	Fair	Wintered in excellent condition
4/19/1937	5/6/1937	90	Wintered in excellent condition

Fig. 1.—*South Dakota Ephedra Sinica.* Fruits of Ephedra sinica, $^1/_2$ natural size. Each berry-like fruit holds two seeds, one of which is shown in the picture.

Ephedra sinica seed, therefore, may be sown outside in the spring, just as soon as the beds can be prepared for sowing. Seeds sown between the dates of March 28th and May 19th, germinated well and even the latter date allowed time for the young plants to develop so that they were able to winter in the field.

Various methods of seed planting were also tried in the outdoor plots in an attempt to find how they should be sown. In 1934 broadcast seeding was tried in hopes that the plants might more quickly produce a covering which would prevent wind erosion. The seeds were sown by hand and disked in with a small hand disk. Seed germination in this plot was scattered due, no doubt, to the various depths to which they had been covered by the disk. For this reason it was extremely difficult to keep the beds clean without damaging the ephedra for many of the smaller plants were pulled up along with the weeds. Although germination was finally estimated at about eight per cent, the method was discontinued after the initial trial.

Garden planters and drills were tested out in 1935 but the results were far from satisfactory. The uneven spacing of the plants in the rows made it difficult to tend the small plants.

The seeds sown in rows according to the following directions gave the best results: (1) Prepare the bed early by spading it up and carefully raking it over and then allow the loose soil to settle before planting. (2) Make the rows by creasing the top soil with the sharp edge of a board to a depth of one-half to three-quarters of an inch. (3) Plant the seeds in these rows one to two inches apart, and cover them with a mixture of equal parts of sand and soil. Press down firmly. (4) Keep the beds well watered until the seeds have germinated. The rows should be at least thirty inches apart so as to prevent packing of the soil around the small plants during cultivation.

Seeds planted according to these specifications gave an improved germination count over the other methods tried. The above spacing of the seedlings also allowed freedom of cultivation and gave the small plants plenty of room for development until such time as they were ready for transplanting to the field at the end of their second or third growing season.

The very excellent results obtained from seeds sown directly into the garden plots made planting under glass unnecessary except for seed testing, where actual germination was recorded and no attempt was made to save the plants for the field. "Damping off" proved a serious menace to the early starting of plants in the greenhouse. Even in sterilized soils it was difficult to control, and very soon discouraged anything but field planting in the outdoor plots. Considering the extreme adversity of the seasons the plants started from seeds have come through, it is reasonable to conclude that ephedra can be successfully propagated from seeds sown directly in outdoor beds

PROPAGATION FROM ROOT STOCK.

The first attempts to subdivide the older plants and so increase their number were unsuccessful for the numerous stems all seemed to join the one main root system. It was noticed though that as the plants matured they sent out lateral rhizomes which approached the surface of the ground and then developed stems only at their tip ends while still attached to the old plants. By working around the older plants with a long sharp spade, the rhizomes could be cut and stimulated to increase their own root system. By cutting these new shoots and then allowing them to remain undisturbed until the next spring, they could be transplanted with scarcely the loss of a single plant. This proved to be a convenient and rapid means of increasing the number of plants.

Again in the spring of 1937 after the plants had matured a little more, another attempt was made to subdivide the larger clumps of ephedra. Apparently the more favorable growing conditions had stimulated them to a vigorous production of new rhizomes which had clustered in close to the old plant as they matured. These were all massed together in a tangle of roots which necessitated cutting before they could be separated into the individual plants suitable for transplanting. Best results were obtained by dividing these older plants in the spring before active growth had started, although ephedra transplanted very well at any time during the summer. A transplant record was kept in order to have a check on the relative number of plants lost during propagation procedures. The results are shown in Table III.

TABLE III.

Year.	No. Transplanted.	Plants Lost.	Per Cent Mortality.
1934	73 from rhizomes	2	2.7 negligible
1935	120 from rhizomes	2	1.6 negligible
1936	24 seedlings	0	0 negligible
1937	450 from rhizomes	50	11.1 moderate

Ephedra transplants very well, especially when care is taken to use plenty of water around the plants when they are reset.

During the process of propagation, note was made of the spacing of the plants so as to determine the area which should be allowed for each plant when they were placed permanently. Spaced as they were in 1935, an acre would accommodate about 8,904 plants. However, by the end of the 1936 growing season, the plants were very obviously crowding each other in these plots as evidenced by the more vigorous development of their neighbors which were spaced farther apart. Leaving ample room for cultivation along the edges of the field, it is estimated that an acre should take about 6,500 plants. This would allow ample room for the plants to stool out and the rhizomes would soon fill in the intervening spaces to form a sod.

SUMMARY AND CONCLUSIONS.

A study was made to determine the quality of Ephedra sinica seeds produced in South Dakota and to investigate the possibilities of propagating the species from both seeds and root stock. An attempt was also made to root stem cuttings of ephedra. From the information collected the following conclusions are possible:

1. Ephedra sinica produces viable seeds of good quality when grown in South Dakota.
2. Propagation from seeds is best handled by sowing the seeds in rows, directly in the outdoor plots.
3. Ephedra sinica can be propagated from its root stock.
4. Stem cuttings did not root.
5. It is estimated that an acre should accommodate about 6,500 plants.

REFERENCES.

(1) Youngken, H. W., *Am. J. Pharm. Ed.*, 2, 241 (1938).
(2) Youngken, H. W., *Herbarist*, No. 3, 12 (1937).
(3) Christensen, B. V., and Hiner, L. D., Jour. A. Ph. A., 25, 969 (1936).

II. Cultural Investigation.

Coincident with the experimental work on propagation methods for ephedra, observations were likewise being made on the problems pertaining to cultivation of the plants in the field. The mere fact that a species can be propagated in a locality is no assurance of its suitability for commercial cultivation. Such factors as climatic adaptation, soil types, topography, may entirely eliminate such possibility. This investigation was carried out to determine if any of these factors might limit the production of ephedra in South Dakota.

Naturally, the first point of interest in the introduction of a foreign species is whether or not it is climatically adapted to its new environment. Because of the extremely variable winters in South Dakota it was predicted that some of the plants would surely be killed. This would of course necessitate replanting each spring to fill in for missing plants. It would be desirable to determine about what per cent this would be in order to have sufficient plants coming on for replacements. The possibility of using mulches to reduce winter killing was also considered.

The winter of 1933–1934, according to the garden records, was dry and open with very little snow during the cold months. South Dakota suffered its worst "black blizzards" of eroding top soil the next spring for there was no moisture to prevent the soil from blowing. In spite of these adverse weather conditions the number of plants lost by winter killing was negligible.

The 1934–1935 winter months were average with enough snowfall to mulch the plants well, and a moderate amount of cold weather. No plants were lost as shown by a check of the beds in the spring of 1935. During this winter uncut plants were left in the field on the supposition that the stems might be perennial like the roots, and that allowing them to mature might increase their seed production and alkaloid content. Enough were left uncut so some could be matured into their fourth and fifth growing seasons should it be desirable.

The winter of 1935–1936 and the growing season of the latter year gave the ephedra plants a real opportunity to prove themselves. Several weeks of 30° to 40° below zero weather during January and February established it as the coldest South Dakota winter in fifty years. During this weather the plants remained upright, blackened in color considerably, but when the final spring check was made only one plant was missing.

The growing season which followed was one to tax the endurance of even the most deeply rooted and hardy perennials. July and August were marked by unusually hot and dry winds blowing in from the parched Southern states which literally seared most of the green vegetation. Grasshoppers were abundant too and this combination left the state rather barren in several spots. In spite of this, the ephedras recovered from the cold winter, increased seed and stem pro-

duction and, unmolested by the grasshoppers, they took advantage of the late fall rains which sent them into the winter in excellent condition.

Again in 1936–1937, the winter months were fairly mild, and characterized by an abundance of snowfall. Deep drifts covered the plants all winter and again none were lost. After watching the plants through these several seasons, there remains not the slightest doubt of their ability to withstand the rigors of South Dakota's climate.

The use of mulching was continued from 1934 through the winter of 1937. Results are indicated in Table IV.

TABLE IV.

Winter.	No. Mulched.	Unprotected.	Plants Lost.
1933–1934	25	200	None
1934–1935	24	200	None
1935–1936	24	250	One mulched plant
1936–1937	24	250	None

A variety of material was used in these mulch tests. Straw was raked in close around some so that it did not bend the stems down. Others were completely covered with leaves and straw and some were mulched with cornstalks to support the weight of the straw which was thrown on top. This was done to allow for freedom of circulation about the stems underneath.

It was observed that mulches not only were unnecessary, but were even a disadvantage to the plants. Frost persisted much longer under the mulch when spring opened and during the melting of the snow many stems were bent down and frozen into the ice. Ephedra naturally tends to collect its own mulch of leaves and snow, making artificial mulching quite unnecessary. (See Fig. 2.)

Fig. 2.—*South Dakota Ephedra Sinica.* Ephedra naturally tends to collect its own mulch by its numerous erect stems which catch blowing snow and leaves. The snow was removed from these plants to illustrate the natural position they maintain during the winter. The tops of the other plants in the plot can be seen protruding through the deep mulch of fallen snow.

In order to determine the hardiness of ephedra among the native weeds and grasses, some mature plants were transplanted directly into a plot of quack grass and weeds. They continued to grow and appeared to stand the dry, hot weather better than the weeds and grass. At the end of three years, the ephedra had stooled out and formed a tough sod and was choking out the quack grass. It has also been observed that the ephedra rhizomes are now spreading out through the sod paths which border the plots. Once ephedra becomes established, it is seemingly not hampered in its development by the presence of other vegetation.

The summer of 1935 was very favorable for observing what effect stem rusts, smuts and molds would have on the plants. Unusual rust and smut damage was suffered in that locality where the ephedra plants were located, but they showed no signs of infestation. According to Dr. Stakeman, University of Minnesota Plant Pathologist and authority on rusts and smuts, there are innumerable physiological strains of these plant pathogens, some of which are specific in the host plants which they seek. To be certain the ephedras had not by chance escaped strains to which they might be susceptible, numerous samples were collected from wheat, oats, rye, barley and corn in the agronomy test plots and deliberate attempts were made to inoculate the ephedra stems. None of these inoculations were successful and strongly indicated that ephedra was not susceptible to the rusts and smuts used in the experiment, nor to those which it has thus far contacted as it grows in the field.

No evidences of insect damage to the ephedra plants have been observed. To be certain, however, various insects which are common to this area were confined in cages with grass and ephedra stems. While insects ate freely of grasses under the cage, they died before more than nibbling the ephedra stems. An ephedra plot and one of spearmint were separated by a narrow grass path. During the summer of 1936 the spearmint was completely devoured by the hoppers and crickets while the ephedra remained untouched. The tests and observations indicate that ephedra is not palatable to the common insects which ordinarily are a menace to crops.

Further cultural experimentation indicated that checking the plants in, in evenly spaced rows so that cross cultivation was possible was the most satisfactory method. Single row shovel cultivators were found satisfactory to keep the soil friable until the plants stooled out forming a sod which made further cultivation unnecessary. Considerable hand weeding was required, however, from then until the sod was complete enough to control the weeds. Eventually the plants produced a growth of stems so heavy that further cultivation was unnecessary except for occasional persistent weeds. Cultivation of ephedra appears to be fairly simple and comparable to that of ordinary farm crops.

SUMMARY AND CONCLUSIONS.

1. Ephedra is climatically adapted to South Dakota.
2. Mulching of the plants is unnecessary.
3. Ephedra is essentially a dry land plant and doesn't thrive in low wet surroundings.
4. The plants are disease and insect resistant.
5. Cultivation is best carried out by checking the plants in rows where they can be cultivated until they form a sod, which makes further cultivation unnecessary.

REFERENCES.

(1) Christensen, B. V., and Hiner, L. D., JOUR. A. PH. A., 25, 969 (1936).
(2) Read, B. E., "Flora Sinensis, Ephedra," Series B, Vol. XXIV, 1, 21 (1930).
(3) Rusby, H. H., and Hart, *Druggist Circular*, 1186 (Dec. 1927).

III. HARVESTING AND CURING.

The details of time, method of collection and the process of drying for both seeds and stems were studied in this phase of ephedra production. When the plants were placed under cultivation, seed production increased steadily, especially after it was found the stems were perennial. While this promised to materially aid propagation, it also raised the question of how the

seed could best be harvested. Data concerning seeds collected from two plots which were uncut for four seasons are shown in Table V.

TABLE V.

Year.	Stem Age.	Seed Weight.	Date Matured.
1934	1 year	15 Gm.	September
1935	2 year	25 Gm.	August
1936	3 year	40 Gm.	July and Aug.
1937	4 year	720 Gm.	July and Aug.

Ephedra seeds will average about one hundred seeds to the Gm. Besides the very remarkable increase in yield, it was noted that on the older stems seeds matured at an earlier date thereby avoiding all danger from frost.

Since seeds ripen over a long period of time, it is impossible to make one complete and final harvest. Furthermore, the plants are not suited to machine collection for many seeds are borne close to the ground on the lower stems. (See Fig. 3.) As the fruits ripen they fall at the lightest touch except for a very few plants on which they persist for some time. Several methods of collection were attempted such as brushing a screen basket through the plants and using a reel for brushing them back on to a platform but none were successful enough to be recommended as a feasible commercial method. Collection of seeds by hand, therefore, seems the most logical.

The next problem considered was that of curing and threshing. When the fruits are dried they assume a rasin-like consistency and even after months of drying they do not thresh well. Hand threshing mills were tried but the results were quite disappointing.

Since each berry holds only two seeds, some of these were planted and it was found that the seeds germinated equally as well, if not better, than the seeds alone. Presumably the fruit mesocarp held enough moisture to successfully germinate the seed and start the young plant even when the soil was so dry that seeds alone were delayed in sprouting. This perhaps is nature's method of insuring good germination of the self-sown seeds of these dry land plants. The best means of handling ephedra seed is to gather the whole fruits by hand, cure them and then either plant the fruit as it has dried or separate the seeds by hand if desired.

Fig. 3.—*South Dakota Ephedra Sinica.* Ephedra plants are not particularly suited to a machine harvest of the fruits or seeds. Many of the fruits are clustered close to the ground, and when ripe they fall at the slightest touch.

The logical time of year for harvesting ephedra stems is when their alkaloidal content is highest. It has been reported that the ephedrine content is highest in the fall of the year (1) and that the stems should be cut at that time (2). To determine proper time for harvesting, cuttings were made at various dates and subsequently assayed to determine the ephedrine content. A complete record of the harvests and assays for the one- and two-year old stems is contained in a preliminary report published in 1936 (3).

This work was continued until data had been collected for stems matured during four growing seasons. Seed and stem production continued to increase as the stems matured. Data

concerning alkaloid content, date of harvesting and method of curing for three-year stems harvested in 1936 are shown in Table VI.

TABLE VI.

1936 Harvest Dates.	Care.	Assay.
1. September 21st	Sun Cured	0.421%
September 21st	Shade Cured	0.418%
2. September 28th	Sun Cured	0.401%
3. October 7th	Sun Cured	0.416%
4. October 12th	Sun Cured	0.339%
5. October 17th	Sun Cured	0.401%

It is to be noted that the ephedrine content has continued to increase with aging of plants although not as markedly as in the case of the two-year as compared to one-year stems. It is to be noted also that sun-cured stems of the September cuttings contained the highest per cents of ephedrine.

Data for four-year stems harvested in 1937 are shown in Table VII.

TABLE VII.

1937 Harvest Dates.	Care.	Assay.
1. September 25th	Sun Cured	0.740%
September 25th	Shade Cured	0.770%
2. October 5th	Sun Cured	0.740%
October 5th	Shade Cured	0.812%
3. October 9th	Sun Cured	0.764%
October 9th	Shade Cured	0.818%

It is to be noted that the assay of the four-year stems is approximating that of the imported drug and particularly that the ephedrine content is steadily increasing with aging of the plants. Considering the fact that the Chinese plants are growing wild, it is quite likely they too have matured several seasons in order to develop their high ephedrine content. If this is the case there is a good possibility that the American grown drug will eventually equal the imported stems in its ephedrine content.

Cuttings were also made each year of the one-year stems in order to keep informed on any changes which might have occurred. All of these continued to run low in their alkaloid content; about 0.1 per cent. However, it was noticed that in 1937 those one-year stems which were cut from root stock that had not been disturbed for three years showed a distinct increase, up to 0.278 per cent. When the plants are no longer disturbed for propagation purposes, it may prove benefical to their production of ephedrine.

In corroboration of the earlier findings, this additional information bears out the conclusions that ephedra should be cut in late September or early October, and that sun-curing in the field is a satisfactory means of drying the drug. It cures very slowly and may have to be stored indoors for some time before the drug will powder readily, especially if the season is wet. Stems cured in the shade retained their green color, but the slight difference in the assay was not sufficient to warrant the extra labor involved in handling it in this way.

Getting the stems cut proved the most perplexing of the harvesting problems. The one- and two-year stems were easily cut with an ordinary mower, but by the end of the 1936 growing season, the three-year stems had become so lignified and matted together that they were difficult to handle. Many of the stems were also flattened to the ground due to the extra weight of increased stem production, which would necessitate the use of a mechanical pick-up in front of the sickle bar. Those stems which were uncut would not be lost, however, for they would bud at their nodes the following spring and serve to increase the number of stems produced by the plants the next year. Ephedra is seemingly adapted to such a harvest as is carried out with ordinary farm haying tools, although stem development may eventually necessitate other means of cutting.

SUMMARY AND CONCLUSIONS.

A study was made of the best time of the year for harvesting ephedra seeds and stems and of the methods best suited for their proper curing.

1. The seeds are best collected by hand picking the fruits. After the fruits are dried, the seed can either be separated or the whole fruit can be planted just as it has been cured.

2. The stems should be cut in late September or early October. Sun curing is satisfactory.

3. Farm haying tools seem well adapted to handling this drug by using mowers to cut the stems, allowing them to cure in the sun, and either stacking the stems or baling them for shipment.

4. As the stems mature, they become so lignified it may make other means of cutting them a necessity.

REFERENCES.

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IV. ASSAY[1] AND COMMERCIAL ASPECTS.

Since ephedra is not official, standards and methods of assaying are left to the discretion of the various concerns handling ephedra products. Hence, such firms have developed their own methods for evaluation of the drug. Through the courtesy of one of these firms a recognized commercial assay procedure was supplied and used in obtaining data presented herewith.

In assaying ephedra some peculiarities were encountered, namely,

1. The alkaloid is water soluble (1), and easily decomposed by direct heat.

2. Ephedrine is hygroscopic.

3. Stronger ammonia water in excessive amounts is required to free ephedrine from its salts (2).

4. Time is an important factor in the assay process when chloroform is used in the menstruum. Ephedrine hydrochloride is formed when the alkaloid is allowed to stand or evaporate in this solution (3), thus reducing the total alkaloids as indicated by the final titration.

5. Many of the common alkaloidal precipitants do not give their characteristic reaction with this alkaloid (4).

6. Evaporation to dryness, particularly with heat, is not advisable in evaporating the final ethereal solution prior to titration.

7. A single plant does not constitute a representative sample. Great variation occurs in the alkaloid content of different plants within the same plot. Mix the powder thoroughly before assaying.

8. The alkaloid is confined to the stems.

Unless all of these points are observed in assaying ephedra, discrepancies are certain to result. The following procedure is, therefore, recommended for the determination of total alkaloids in ephedra.

1. Use 10-Gm. samples in a fine powder, accurately weighed with allowance made for the moisture content.

2. Place the powder in a suitable percolator after first wetting the cotton pledget in the bottom with ether, saturate the drug with ether-chloroform menstruum, 4:1, and allow to stand at least five minutes. Add 10 cc. of 28 per cent ammonia water, mix thoroughly and after 15 minutes add an excess of the ether-chloroform menstruum and allow to macerate over night.

3. The next morning pack the drug firmly and percolate at a moderate rate using ether-chloroform menstruum in the same proportion, 4:1. Continue percolation until 300 to 400 cc. of percolate have been collected. For the 10-Gm. samples this always gave complete extraction as indicated by the use of suitable precipitants.

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[1] Acknowledgment to Eli Lilly and Company for the original assay procedure used.

4. Transfer the percolate to a separatory funnel and completely extract the alkaloid by shaking with several portions of 2 per cent sulfuric acid. Filter each portion as drawn off, wash the filter, and then wash the combined acid extract with three 40-cc. portions of ether to remove traces of chloroform which may have carried through.

5. Add a portion of ether to the acid solution, make strongly alkaline with a decided excess of stronger ammonia and completely extract the freed alkaloids with several successive washings of ether as recommended by the U. S. P. XI, page 146. A Palkin-Watkins continuous extraction apparatus was used to good advantage in this step (5). From this point to completion proceed as recommended by the U. S. P. XI for assay of ephedrine salts.

This procedure gave consistent results as evidenced by the uniform figures reported by different workers assaying samples of the same drug.

Another problem considered was that of relative yields of crude material produced in (*a*) growing periods of one year, two years, three years and four years with annual harvests, (*b*) with harvests at the end of one year, at the end of two years, at the end of three years and at the end of four years.

(*a*) With annual harvests, each year shows an increase in yield as indicated in Table VIII.

(*b*) Yields of two-year plants was greater than that of any one annual harvest and approximately equal to that of both annual harvests of the first two years. Yields of three-year and four-year plants continued to increase but the increase in weight from year to year was not constant, *i. e.*, four yearly harvests in the end yielded more crude drug than one cutting at the end of the four years as indicated in Table IX as compared to data in Table VIII.

TABLE VIII.

Year.	Stem Age.	Per Acre Yield.
1934	1 year stems	3,485 pounds
1935	1 year stems	3,502 pounds
1936	1 year stems	3,890 pounds
1937	1 year stems	4,000 pounds

TABLE IX.

Year.	Stem Age.	Per Acre Yield.
1935	2 year stems	6,921 pounds
1936	3 year stems	8,421 pounds
1937	4 year stems	10,101 pounds

Over a four-year period of time four yearly harvests yielded a total of 14,877 pounds of drug per acre, as compared to 10,101 pounds per acre taken as one cutting at the end of four years. However, other factors such as quality of the stems are of importance. Hence, data showing weights harvested, alkaloid content and yield of total alkaloids is given in Table X.

TABLE X.

Year.	Stem Age.	Per Acre Yield.	Assay.	Total Alkaloids.
1933	1 year	3,845 pounds	0.126%	4.84 pounds
1934	1 year	3,845 pounds	0.150%	5.22 pounds
1935	1 year	3,502 pounds	0.153%	5.35 pounds
1936	1 year	3,890 pounds	0.167%	6.49 pounds
1937	1 year	4,000 pounds	0.214%	8.56 pounds
1935	2 year	6,921 pounds	0.366%	25.33 pounds
1936	3 year	8,421 pounds	0.421%	35.45 pounds
1937	4 year	10,101 pounds	0.818%	82.82 pounds

From the above it is apparent that the four-year old stems represent the best prospect for per acre yield of total alkaloids and consequently the best prospect for commercial production of ephedra. Not only is the yield of active principle superior, but it has in its favor the fact that there

is less expense involved in handling one cutting as compared to several. The four-year stems have developed an ephedrine content which should satisfy commercial demand.

Based on estimates received by submitting samples of ephedra from the four-year lot to various buyers, an acre should produce approximately $303.00 worth of ephedra each four years, or an average of $75.75 per year. It should also be considered that:

1. The plants have been continually disturbed for propagation purposes, and have not yet reached their full production capacity.
2. There is positive evidence that the alkaloid content will increase when the plants are left undisturbed.
3. The intention is to grow ephedra on land which at the present time is unproductive, sub-marginal land.

Future prospects for ephedra cultivation appear quite encouraging.

SUMMARY AND CONCLUSIONS.

Yields of ephedra per acre were determined from stems of various ages. These were assayed and data assembled concerning the commercial aspects of South Dakota grown ephedra. The following conclusions were reached.

1. A suitable assay procedure is recommended.
2. Four-year stems represent the best prospect for commercializing ephedra production.
3. While many phases of the problem remain to be studied, South Dakota can produce Ephedra sinica of commercial value, and especially so in case of a national emergency.

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THE PHARMACOLOGY OF SOAPS.*

BY LEROY D. EDWARDS.[1]

The United States Pharmacopœia, eleventh revision, does not require, as did former editions, that the official soap (Sapo Durus) be made from olive oil. This soap may now be prepared from any oil or mixture of oils so long as it meets several chemical and physical tests as described in the U. S. P. The reasons[1] given for this change were that soaps possessing similar chemical characteristics to a soap made from olive oil may be made from mixtures of various oils, and that there are no chemical means to differentiate between such soaps. This change may be questioned on the ground that soaps made from various oils or mixtures of oils may possess, as determined by our present day methods, chemical and physical properties similar to those of an olive oil soap but may, at the same time, show different physiological reactions, *f. i.*, irritant effect upon the skin.

The following studies of the action of soaps on red blood cells and earthworms are offered as an approach to this problem.

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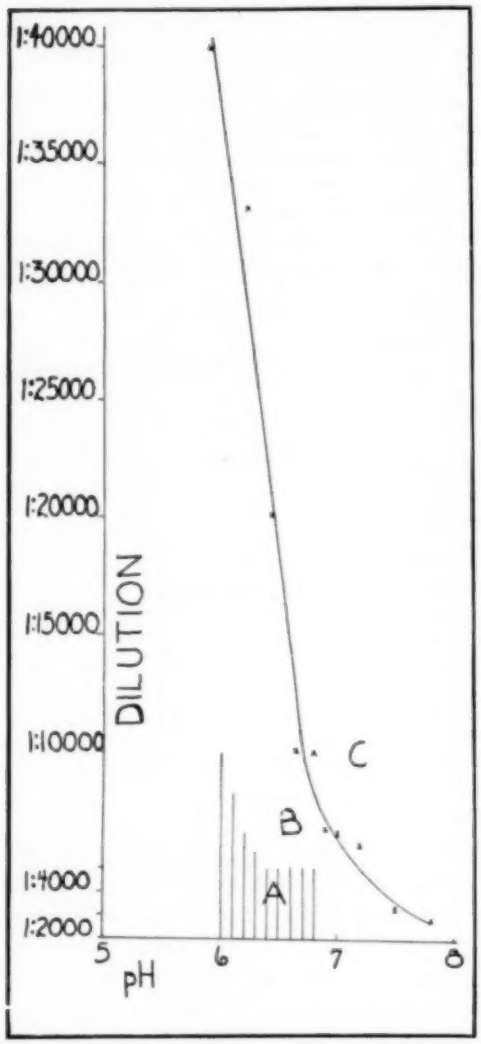
* Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] From the Department of Pharmacology, School of Medicine, and the School of Pharmacy, Western Reserve University.

CHEMISTRY OF THE SOAPS EMPLOYED.

The fatty acids—lauric m. p. 42–43 C., myristic m. p. 52–53 C., palmitic m. p. 61–62 C., stearic m. p. 69–70 C.,—were obtained from the Eastman Kodak Company. The oleic and ricinoleic acids were purchased from Kahlbaum. Pure sodium lauryl sulfate was furnished by the Procter and Gamble Company. The absolute purity of some of these acids may perhaps be questioned, but their purity should be sufficient to indicate any possible differences in properties of the various fatty radicles. The sodium and potassium soaps of the solid fatty acids were prepared by adding a computed amount of $N/1$ alkali to a weighed amount of fatty acid suspended in water, and with subsequent warming on the water-bath. After thorough drying in an electric oven the soaps were reduced to a fine powder. The liquid acids were dissolved in absolute alcohol and titrated to neutrality with a strong solution of alkali using phenolphthalein as an indicator. These soaps were also dried and pulverized. In each case the final product was tested for the presence of free alkali and free fatty acid by titrating one Gm. of the soap, dissolved in 50 cc., of boiling alcohol, 95%, which had been previously neutralized to phenolphthalein, with $N/10$ sulfuric acid or $N/10$ sodium hydroxide.



Graph 1.—Lysis of human RBC by sodium laurate. (A) Zone of clumping. (B) Zone of complete lysis. (C) Zone of no lysis. End-point—greatest dilution of soap causing complete lysis of 1 cc. of a 5% human RBC suspension.

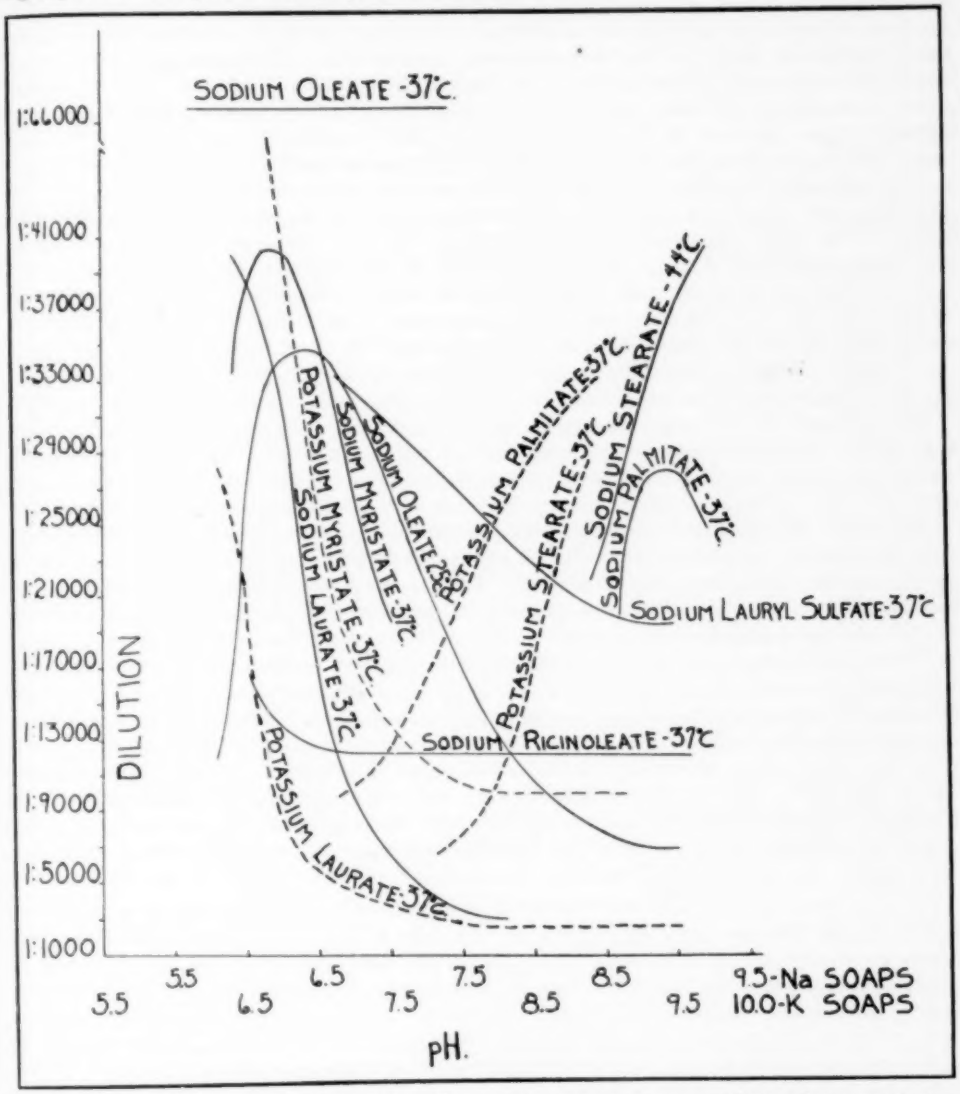
METHOD USED IN HEMOLYTIC TESTS.

One cubic centimeter of each concentration of soap in buffered saline (1 part of buffer mixed with 9 parts of 0.9% saline) was added to 1 cc. of a washed, 5%, human red cell suspension in buffered saline of the same p_H as the soap solution. This mixture was placed in a constant temperature bath for one hour. Most experiments were run at 37 C., some at 25 C. and some at 44 C. In making the readings, the end-point chosen was the dilution which showed no presence of red cells, and was for the most part clear. In all experiments two controls were prepared: (1) soap only in buffered saline and (2) blood cells only in buffered saline. The p_H of the buffered soap solution was checked by means of a quinhydrone potentiometer up to and including a p_H of 8.2.

EXPERIMENTAL RESULTS.

The method as outlined above was used to determine the lytic values of the following soaps: sodium laurate, sodium myristate, sodium palmitate, sodium stearate, sodium oleate, sodium ricinoleate, sodium lauryl sulfate, potassium laurate, potassium myristate, potassium palmitate and potassium stearate. One of the striking features of the results obtained, especially with sodium and potassium laurate, sodium lauryl sulfate and sodium oleate is the appearance, over a dilution range and at certain

H-ion concentrations, of three zones of hemolysis (Graph 1). Zone A, soap concentration highest, is characterized by a cloudiness which, toward the end of the one-hour period, becomes more or less agglutinated. Under the microscope these clumps are seen as colorless irregular-shaped masses. Hemolysis probably should be regarded as complete. Zone B, soap concentration less, is devoid of any solid material and lysis is complete with a clear final mixture. Zone C, soap concentration least, showed a gradation of some to no hemolysis. The results for the soaps as a group can best be presented in graphic form (Graph 2).



Graph 2.—The hemolytic values of sodium and potassium soaps. End-point—greatest dilution of soap causing complete lysis of 1 cc. of a 5% human RBC suspension.

DISCUSSION OF RESULTS.

The curve as determined for sodium oleate at 25 C., appears to be the single hemolytic curve that may be considered as a typical curve, and for the purpose of this discussion it will be used as such. This curve, beginning at the acid side, shows with a decreasing H-ion concentration a rather abrupt rise in hemolytic power which reaches its maximum height at p_H 6.2. This same

value is found at p_H 6.6, but from there on the curve gradually falls with a decreasing H-ion concentration. The sodium and potassium laurate curves at 37 C., in contrast, show only one leg which falls as the H-ion concentration is decreased—a condition met only with the fall or the right leg of the typical curve. Therefore, it appears justifiable to state that the laurate curves, as determined, are comparable only to the right leg of the sodium oleate curve at 25 C. The curves for sodium myristate and sodium palmitate, although incomplete, exhibit a rise and a fall of hemolytic power in a fashion similar to that described for the typical curve used for discussion. Sodium stearate at 44 C., and potassium stearate at 37 C., present an entirely different situation. Here the curves rise as the H-ion concentration is decreased—a condition noted for the rise or the left leg of the typical curve. On this ground, the statement may be made that only the left leg of the stearate curves has been determined. A relationship between the curves of sodium oleate at 37 C., and sodium ricinoleate at 37 C., both straight lines, and the typical curve is somewhat difficult to demonstrate. However, the sodium ricinoleate curve does tend to rise at the acid side. This suggests that this curve is similar to the extreme end of the right leg of the typical curve. Although there is no direct proof, it does not seem unreasonable to assume that this explanation is also applicable in the case of the straight line curve of sodium oleate at 37 C. This survey of the hemolytic curves as obtained indicates that, over a sufficiently wide range of p_H, each soap should show a hemolytic curve similar in all respects to the typical curve of this discussion. The hemolytic value, beginning on the acid side, would be low. Then with a reduction of the H-ion concentration, the curve, at some certain p_H, would rise to a maximum, and then finally with a further reduction of the H-ion concentration the curve would fall.

If the assumption that the curve for sodium oleate at 37 C., is the extreme end of the right leg of the complete curve is correct, then by comparing this curve with the one obtained at 25 C., it can be stated that the temperature has a marked effect upon the p_H position of the rise in the lytic curve. Further evidence in support of this view is noted in the fact that the rise in the curve for sodium stearate was obtained at 44 C., but could not be determined over the same p_H range at 37 C. These observations indicate that the increase in the temperature is responsible for a shift in the rise of the lytic curves on the p_H scale toward the acid side. In addition the conclusion may be drawn by comparing these two oleate curves that an increase in temperature at a given p_H increases the hemolytic power of the soap. This increased hemolysis may be due solely to an increase in the velocity of the hemolytic reaction, but it is also highly probable that the solubility of the hemolytic component is enhanced.

It is also to be noted that when the different soaps are compared as to their maximum hemolytic power at a given temperature, p_H being disregarded, sodium oleate, a soap of a straight chained unsaturated acid, is the most hemolytic, and that sodium ricinoleate, a soap of a straight chained unsaturated hydroxy acid, appears to be the least hemolytic. The values of the maximum hemolytic powers of the soaps of the saturated fatty acids fall between these two extreme values, and may be arranged in the following order: sodium laurate > sodium myristate > sodium palmitate > sodium stearate. Thus it is apparent that the hemolytic power of a soap bears a relation to the configuration of the fatty acid molecule from which the soap was made. At a given p_H, however, this order, as outlined above, does not hold.

The effect of increasing or decreasing the H-ion concentration at a given temperature produces with the different soaps varying results. Starting at p_H 7, an increase in the H-ion concentration caused sodium laurate at 37 C., to become more hemolytic; sodium myristate at 37 C., gave increased hemolysis up to a maximum value and this was then followed by a slight decrease; sodium oleate and sodium ricinoleate showed no change of any kind; while in the cases of sodium stearate and sodium palmitate the results were considered uncertain. With a decrease of H-ion concentration from p_H 7, sodium ricinoleate curves, again are unchanged; that of sodium palmitate shows a rise with a subsequent slight fall; and finally the curve for sodium stearate at 37 C., was unobtainable.

It is most difficult, with these data, to conclude as to the factor or factors responsible for the observed augmentation and diminution of the hemolytic value of a soap at various p_H ranges. The possible causes worthy of consideration as the active lytic agent of a soap solution are (1) the free alkali of soap solutions, (2) undissociated soap, (3) free fatty acid, (4) fatty acid ion, (5) acid soap. The fact that all aqueous solutions of soaps are alkaline is well known, and many physiological properties of soap solutions have been explained upon the basis of this alkaline reaction.

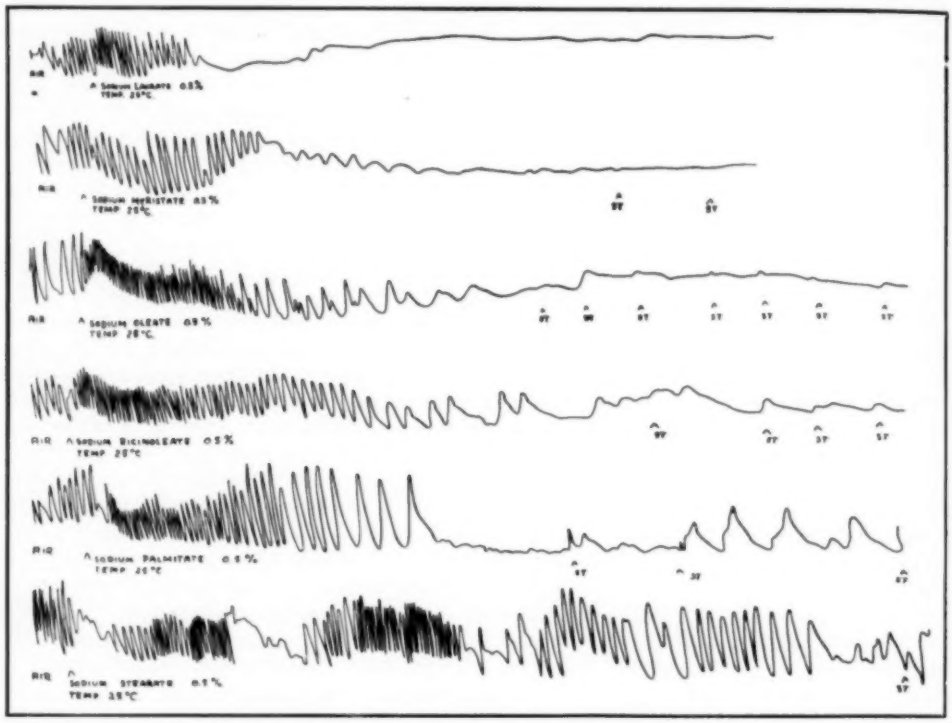
As far as hemolysis as produced by sodium laurate is concerned, it can readily be demonstrated that the addition of small amounts of alkali causes an actual decrease in the degree of hemolysis. The hemolytic curves for sodium and potassium laurate, sodium and potassium myristate, and sodium oleate at 25 C., all show in the more alkaline ranges a decrease in the hemolytic reaction of these soaps. This evidence surely is sufficient to force the conclusion that free alkali, within reason, in a soap solution is not the predominant lytic component of that solution. A second product of the hydrolysis of a soap is the free fatty acid, and likewise this has been assumed by different writers to be the underlying cause of the hemolytic property of soap solutions. It is, of course, an established fact that the lower fatty acids are, by themselves, markedly hemolytic, and it is only logical, in spite of the slight solubility of the fatty acids found in the common soaps, to suspect the fatty acid content of soap solutions of having something to do with the hemolytic property of those solutions. At the extreme left of the p_H range, the concentration of the free fatty acid will be at its greatest amount, and at the right extreme the amount in comparison will be very much reduced. Then it naturally follows that the amount of undissociated soap present at the left extreme of the p_H range will be very slight, and at the alkaline extreme the undissociated soap will predominate. Applying these conditions to the typical curve, sodium oleate at 25 C., it is noted that at the left side where the fatty acid content is the greatest the hemolytic curve falls sharply. If the fatty acid is responsible for the hemolysis this could not take place. The curve in this range could become a straight line due to the fact that the solution had become saturated with free fatty acid, but it could never fall below the maximum reached if the free fatty acid is the hemolytic component. Sodium lauryl sulfate solutions, where theoretically no fatty acid should exist, has also been shown to be markedly hemolytic. Thus, this evidence makes it very doubtful that the free fatty acid, as such, is greatly concerned in the hemolytic reaction of soap solutions. Turning to the right extreme of the p_H range where the undissociated soap is at its greatest concentration, the hemolytic curve is again found to be greatly reduced. Using the same method of reasoning as employed in the case of the free fatty acid, the undissociated soap likewise can be eliminated as the active lytic agent. This observation of a fall in the lytic curve in the p_H zone where the undissociated soap is at its greatest concentration would also tend to remove the fatty acid ion as the causative agent of hemolysis. If the fatty ion were the lytic component, the soap would continue to dissociate in spite of the reduced H-ion concentration to supply the deficit of fatty ions caused by their removal in the lytic reaction. Thus the curve would rise rather than fall. With this discussion, it becomes apparent that the cause of hemolysis as produced by aqueous soap solutions is some product produced by the hydrolysis of a soap intermediate between the undissociated soap and free fatty acid. This view is forced by the fact that in this intermediate zone on the p_H scale the typical curve reaches its maximum. The acid soaps of aqueous soap solutions appear to satisfy the conditions as developed in this discussion. Although their exact composition is unknown, it is generally agreed that they represent intermediate products between the neutral soap and the free fatty acid. While their solubility is not high, it should be by virtue of the presence of sodium, greater than that of the free fatty acid. This increase of the solubility of the higher fatty acids by their combination with undissociated soap to form a hemolytic acid soap would still leave the primary lytic properties with the fatty acid.

ACTION OF SOAPS ON EARTHWORM SEGMENTS.

Earthworms were decapitated and short segments connected to a lever which recorded the rhythmatic movements of the segment on a smoked drum. After the movements of the segments had been established in air, a bath of 0.5% of soap in water at 25 C. was applied and the movements recorded. The results are given in Graph 3. With sodium laurate the movements were at first increased in rate, but soon disappeared completely. The segment did not respond to electrical stimulation. With sodium stearate the segment continued active throughout, and did respond to electrical stimulation. The actions of sodium myristate, sodium oleate, sodium ricinoleate and sodium palmitate are intermediate between the two above extremes. Controls using air, water and sodium hydroxide solutions of the same p_H as the soap solutions did not greatly interfere with the rhythmic activity of the segment. From these data, the toxicity of the soaps examined for earthworm segments can be stated, starting with the most toxic, as follows: sodium laurate, sodium myristate, sodium oleate, sodium ricinoleate, sodium palmitate and finally sodium

stearate. This classification compares favorably with the results of the hemolytic tests with the exceptions of sodium oleate.

Studies of the actions of soaps on human skin are in progress and will be reported later.



Graph 3.—The action of soaps on earthworm segments.

CONCLUSIONS.

(1) Evidence has been offered to support the view that the ultimate lytic component of common soap solutions is the fatty acid molecule, and that it is enabled to act as such through the mechanism of some intermediate product of hydrolysis, *f. i.*, acid soap.

(2) The typical hemolytic curve of a soap shows in the extreme acid range only moderate hemolytic power; then, as the H-ion concentration is reduced, the lytic values rise to a maximum. With a subsequent further reduction of the H-ion concentration, the lytic values are lowered. The rises and succeeding falls in the hemolytic curves of the more soluble sodium and potassium soaps appear at a higher H-ion concentration than do those of the more insoluble soaps.

(3) When the sodium soaps of the saturated fatty acids are compared as to their greatest lytic values, at a given temperature, they may be arranged in the following order: sodium laurate, sodium myristate, sodium palmitate, sodium stearate. This order does not hold at a given p_H.

(4) At a given p_H, an increase in temperature enhances the hemolytic reaction of lesser soluble soaps.

(5) The hemolytic values of potassium and sodium soaps are very similar.

(6) Sodium laurate, of the soaps examined, is the most toxic to earthworm segments. The toxicity of the others are in the order named: sodium myristate, sodium oleate, sodium ricinoleate, sodium palmitate and sodium stearate.

REFERENCE.

(1) U. S. P. Revision Committee, JOUR. A. PH. A., 24, 891 (1935).

A STUDY OF THE ASSAYS OF THE POWDERED EXTRACTS OF BELLADONNA AND HYOSCYAMUS.*,[1]

BY HOWARD H. FRICKE[2] AND K. L. KAUFMAN.[3]

In past years, trouble has been encountered in the determination of the alkaloidal content of the powdered extracts of belladonna and hyoscyamus. The potency of these drugs makes it desirable to remedy the difficulties underlying the assays of their extracts. Our work has been carried on in an effort to determine the exact origin of these difficulties, and thus point the way to more satisfactory analytical methods. Most of the experimental studies were made on the pure alkaloids and the powdered extract of belladonna.

The presence of volatile basic substances which were being determined as atropine, was noted by various workers including Goris and Larsonneau (1), Markwell and Walker (2), DeKay and Jordan (3) and the A. D. M. A. Contact Committee's Sub-Committee (4). A few of the volatile bases have been analyzed, but the chemical natures of most of them have not been determined. The A. D. M. A. Contact Committee's Sub-Committee (4) found that the physiological activity of the volatile bases was weak and inconstant.

Various methods of assay have been suggested by different workers in an attempt to eliminate these volatile bases so that the product may be more easily and accurately standardized. At present there is no process which accomplishes this satisfactorily.

Tsakalotos (5) and several other workers found that the mydriatic alkaloids were not decomposed during the assay process as long as they were not exposed to excessively alkaline solutions or were not left in contact with alkaline solutions for long periods. Schousen (6) and several other authors, however, have found that atropine and hyoscyamine are sensitive to water-bath temperature and may be partially hydrolyzed when subjected to water-bath heat. Durrett (7) stated that the hydrolysis of the mydriatic alkaloids could be prevented by the addition of a little dehydrated alcohol near the end of the evaporation of the final chloroform extract. The A. D. M. A. Contact Committee's Sub-Committee (4) has reported that the final heat treatment of the U. S. P. XI assay causes little or no destruction of the alkaloids.

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* Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] Based on a thesis submitted to the Committee on Graduate Studies of the State College of Washington by Howard H. Fricke in partial fulfilment of the requirements for the degree of Master of Science.

[2] Teaching fellow, State College of Washington, School of Pharmacy.

[3] Assistant Professor of Pharmacy, State College of Washington.

The assay methods for the powdered extract of belladonna were very similar in the various revisions of the pharmacopœia until 1930. The discovery of the volatile bases obtained in the assay procedure brought forth several difficult problems. As a result of much study, the U. S. P. XI assay process was made official.

The chief differences between the U. S. P. X and U. S. P. XI methods are as follows:

1. The U. S. P. X directed that the alkaloids be purified by extracting a suitable portion of the sample with chloroform, then removing the alkaloids from this solvent with 2 per cent sulfuric acid. The acid solution is then extracted with chloroform. The U. S. P. XI method purifies the alkaloids by filtering out the diluent and then extracting the filtrate with chloroform after first making it alkaline with ammonia water.

2. The U. S. P. X method directed that the chloroform be removed by evaporating to about five cc. on a water-bath, adding an equal volume of alcohol and removing the remaining chloroform by evaporation. The U. S. P. XI method directs that the chloroform be removed by evaporating to dryness on a water-bath, and then heating at dryness about fifteen minutes. The residue is dissolved in about five cc. of chloroform and again heated on a water-bath for fifteen minutes. This treatment is repeated a second time.

EXPERIMENTAL.

The materials used for the experimental studies were obtained from various sources. Certain special tests were performed to determine their purity.

A. STABILITY OF ATROPINE AND HYOSCYAMINE IN SOLUTION.

In a previous communication, we have summarized a large number of experiments on the stabilities of atropine and hyoscyamine in solution (8). This work has been checked and extended.

TABLE I.—THE EFFECT OF ALCOHOL ON THE STABILITIES OF ATROPINE AND HYOSCYAMINE IN CHLOROFORM.*

Alkaloid.	Treatment with Alcohol When Evaporated to 5 Cc.	Water-Bath Treatment.	Average Gm. of Alkaloid Returned.	Average Per Cent Alkaloid Returned.
Atropine		Evaporated to dryness	0.03006	100.00
Atropine	Added 5 cc. alcohol	Evap. remaining chloroform	0.03063	100.00
Atropine	Added 5 cc. alcohol	Evap. remaining chloroform	0.03052	100.00
Atropine	Added 5 cc. alcohol	Heated 30 min. after evap'n.	0.03006	100.00
Atropine	Added 5 cc. alcohol	Heated 60 min. after evap'n.	0.02988	99.61
Atropine	Added 5 cc. alcohol	Heated 60 min. after evap'n.	0.02977	99.22
Atropine		Heated 60 min. after evap'n.	0.02936	97.88
Atropine	Sufficient alc. to avoid dryness**	Heated 60 minutes	0.03034	100.00
Hyoscyamine		Evaporated to dryness	0.03000	100.00
Hyoscyamine	Added 5 cc. alcohol	Evaporated remaining $CHCl_3$	0.03046	100.00
Hyoscyamine	Added 5 cc. alcohol	Heated 30 min. after evap'n.	0.02988	99.61
Hyoscyamine	Added 5 cc. alcohol	Heated 60 min. after evap'n.	0.02948	98.26
Hyoscyamine	Sufficient alc. to avoid dryness**	Heated 60 minutes	0.03034	100.00

NOTE: All averages are based on the results of at least four determinations.

* The analytical grade of chloroform was used.

** Several additions of alcohol were made at suitable intervals.

TABLE II.—THE RELATIVE EFFICIENCIES OF THE U. S. P. X AND U. S. P. XI ASSAY PROCESSES AND THE EFFECT OF THE U. S. P. XI FINAL HEAT TREATMENT UPON THE RESULTS OF THE ASSAY.

U. S. P. X Assay.		U. S. P. XI Assay.		U. S. P. X Assay.*	U. S. P. XI Assay.*	U. S. P. X Shake-Out.	U. S. P. XI Shake-Out.
				Fortified Extract.	Fortified Extract.	U. S. P. XI Complete.	U. S. P. X Complete.
Alkaloid Returned **				Atropine Returned **		Alkaloid Returned **	
Grams.	Per Cent.	Grams.	Per Cent.	Grams.	Per Cent.	Grams.	Per Cent.
0.9872	79.00	0.8208	65.70	0.0480	96.00	0.8208	65.70	0.9964	79.71
0.9768	78.14	0.8184	65.44	0.0487	97.32	0.8138	65.12	0.9906	79.17
0.9896	79.17	0.8024	64.20	0.0477	95.54	0.8092	64.74	1.0058	80.47
0.9792	78.34	0.8116	64.93	0.0485	97.04	0.8184	65.49	0.9988	79.90
1.0126	81.00	0.8266	66.13	0.0481	96.24	0.8266	66.13		
Average	Average	Average	Average	Average	Average	Average	Average	Average	Average
0.9891	79.13	0.8160	65.28	0.0482	96.43	0.8178	65.44	0.9979	79.81
±0.0096	±0.76	±0.0072	±0.57	±0.0003	±0.60	±0.0050	±0.40	±0.0044	±0.37

* Atropine returned calculated only on the basis of 50 mg. added.

** Per cent of alkaloid returned based on 1.2500 Gm. of alkaloid per 100 Gm. of extract.

However, it should be made clear that the experimental results, when chloroform is the solvent, will vary with the grade of reagent used. It was found that technical quality chloroform gave much lower results than analytical grade.

The effect of alcohol (95 per cent) on the stabilities of atropine and hyoscyamine was determined by evaporating to about five cc. a solution of the alkaloid in a volatile solvent, and then adding 5 cc. of neutral alcohol. The mixture was then subjected to various heat treatments. The results are summarized in Table I.

B. THE RELATIVE EFFICIENCIES OF THE U. S. P. X AND U. S. P. XI ASSAY PROCESSES AND THE EFFECT OF THE FINAL HEAT TREATMENT.

During the last two and one-half years, much criticism has arisen regarding the U. S. P. XI assay methods for belladonna and hyoscyamus preparations. Accordingly, the processes of the Tenth and Eleventh Revisions of the Pharmacopœia were compared by analyzing the same sample of powdered extract by each method. Extreme care was exercised to follow the exact assay procedure as given in the respective Pharmacopœias. The results obtained are recorded in Table II.

The efficiency of the extraction methods and the inherent loss of each was determined by adding 50.0 mg. atropine to the extract. This fortified product was assayed by each method. The efficiency of each process was indicated by the per cent atropine returned. The results of the experiments are given in Table II.

The effect of the final heat treatment required by the U. S. P. XI was determined on a number of 5.0 Gm. samples as follows: The method of the Tenth Revision was used for shaking out and purifying the alkaloidal solutions. A comparison was made by using the Eleventh Revision shake-out method and the Tenth Revision completion process. The effect of the heat treatment is shown by comparing these results with those obtained by the U. S. P. X and U. S. P. XI assay methods. The results of these analyses are shown in Table II.

C. THE EFFECTS OF VARIOUS DILUENTS ON THE ASSAY PROCESS.

Various diluents may be employed to adjust powdered extracts to their proper strength. Most manufacturers employ some type of starch for this purpose. Many experiments were performed in an effort to determine the effects of some common starches on the assay procedure.

The starches selected were corn, wheat, rice, arrow-root and potato. These were chosen because they are inexpensive, easy to obtain and furnish a variety of characteristics.

Mixtures of starch and atropine were allowed to stand five months before analysis in order to determine if any alkaloid was being adsorbed. The results obtained were then compared with the analyses of freshly prepared mixtures of starch and atropine.

The effect of chlorophyll on the assay process was determined by adding three drops of chlorophyll to mixtures of 30.00 Gm. of starch and 375.0 mg. of atropine. These mixtures were also allowed to stand five months before analysis.

The procedure for these experiments follows: the starch was triturated thoroughly with the atropine. Two Gm. of this mixture was accurately weighed and digested in three parts of alcohol (95 per cent) and one part of water. The solution was made alkaline with ammonia T.S. and extracted with chloroform. The combined chloroform extractions were evaporated on a water-bath to 5 cc., then an equal volume of alcohol was added. The remaining chloroform was removed and the alkaloids determined by titration with $N/50$ sulfuric acid and $N/50$ sodium hydroxide solutions. Part of the combined chloroform solutions were determined by adding 15.00 cc. of $N/50$ sulfuric acid to the solution when it had evaporated to a volume of 5.0 cc. The remaining chloroform was then removed and the alkaloids titrated with $N/50$ sodium hydroxide solution. Methyl red was used as the indicator in all cases. The results of the experiments are summarized in Tables III, IV, V, VI and VII.

TABLE III.—THE EFFECT OF CORN STARCH AND CHLOROPHYLL ON THE ASSAY OF ATROPINE.

Treatment of Combined Chloroform Extractions before Removing the Last 5 Cc. of Chloroform.	Newly Made Mixture of Corn Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Corn Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Corn Starch, Atropine and Chlorophyll. Atropine Returned.	
	Grams.	Per Cent.*	Grams.	Per Cent.*	Grams.	Per Cent.*
Added 5 cc. C_2H_5OH			0.02127	86.12	0.02000	80.96
Added 5 cc. C_2H_5OH			0.02191	88.70	0.01595	64.58
Added 5 cc. C_2H_5OH			0.02225	90.10	0.01815	73.48

Added 5 cc. C_2H_5OH			0.02225	90.10	0.01803	73.00
			Average	Average	Average	Average
			0.02127	88.75	0.01803	73.00
			±0.00033	±1.44	±0.00104	±4.21
Added 15 cc. H_2SO_4**	0.02283	92.42	0.02312	93.60	0.02225	90.10
Added 15 cc. H_2SO_4**	0.02219	89.86	0.02254	91.26	0.02208	89.39
Added 15 cc. H_2SO_4**	0.02191	88.70	0.02254	91.26	0.01971	79.80
Added 15 cc. H_2SO_4**	0.02282	92.42	0.02346	95.01	0.02312	93.60
	Average	Average	Average	Average	Average	Average
	0.02244	90.85	0.02266	92.78	0.02179	88.22
	±0.00039	±1.57	±0.00037	±1.52	±0.00104	±4.21

* Analyses calculated on the basis of 24.70 mg. per sample taken as 100 per cent.

** Fiftieth-normal sulfuric acid solution was used.

TABLE IV.—THE EFFECT OF RICE STARCH AND CHLOROPHYLL ON THE ASSAY OF ATROPINE.

Treatment of Combined Chloroform Extraction before Removing the Last 5 Cc. of Chloroform.	Newly Made Mixture of Rice Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Rice Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Rice Starch, Atropine and Chlorophyll.	
	Grams.	Per Cent.*	Grams.	Per Cent.*	Grams.	Per Cent.*
Added 5 cc. C_2H_5OH	0.02237	90.56	0.01734	70.20	0.02063	83.54
Added 5 cc. C_2H_5OH	0.02092	84.71	0.01919	77.69	0.02000	80.96
Added 5 cc. C_2H_5OH	0.02202	89.16	0.02046	82.98	0.01901	77.00
Added 5 cc. C_2H_5OH	0.02081	84.24	0.02237	90.56	0.01907	77.22
	Average	Average	Average	Average	Average	Average
	0.02153	87.17	0.01984	80.33	0.01968	79.68
	±0.00066	±2.69	±0.00158	±6.41	±0.00064	±2.57
Added 15 cc. H_2SO_4**	0.02364	95.71	0.02069	83.77	0.02034	82.37
Added 15 cc. H_2SO_4**	0.02173	87.98	0.01595	64.58	0.02063	83.54
Added 15 cc. H_2SO_4**	0.02428	98.28	0.02173	87.98	0.01971	79.80
Added 15 cc. H_2SO_4**	0.02046	82.98	0.02104	85.18	0.02063	83.54
	Average	Average	Average	Average	Average	Average
	0.02253	91.24	0.01985	80.38	0.02033	82.31
	±0.00143	±5.76	±0.00195	±7.90	±0.00031	±1.26

* Analyses calculated on the basis of 24.70 mg. per sample taken as 100 per cent.

** Fiftieth-normal sulfuric acid solution was used.

TABLE V.—THE EFFECT OF WHEAT STARCH AND CHLOROPHYLL ON THE ASSAY OF ATROPINE.

Treatment of Combined Chloroform Extractions before Removing the Last 5 Cc. of Chloroform.	Newly Made Mixture of Wheat Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Wheat Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Wheat Starch, Atropine and Chlorophyll.	
	Grams.	Per Cent.*	Grams.	Per Cent.*	Grams.	Per Cent.*
Added 5 cc. C_2H_5OH	0.02433	98.55	0.02439	98.83	0.02329	94.30
Added 5 cc. C_2H_5OH	0.02376	96.18	0.02346	95.01	0.02439	98.83
Added 5 cc. C_2H_5OH	0.02439	98.83	0.02410	97.58	0.02300	93.13
Added 5 cc. C_2H_5OH	0.02410	97.58	0.02469	99.92	0.02387	96.64
	Average	Average	Average	Average	Average	Average
	0.02414	97.78	0.02416	97.83	0.02364	95.72
	±0.00021	±0.90	±0.00038	±1.54	±0.00049	±2.01
Added 15 cc. H_2SO_4**	0.05954	96.81	0.02410	97.58	0.02300	93.13
Added 15 cc. H_2SO_4**	0.05918	96.23	0.02439	98.83	0.02428	98.28
Added 15 cc. H_2SO_4**	0.05896	95.88	0.02439	98.83	0.02376	96.18
Added 15 cc. H_2SO_4**			0.02346	95.01	0.02364	95.71
	Average	Average	Average	Average	Average	Average
	0.05923	96.31	0.02408	97.56	0.02376	95.82
	±0.00021	±0.34	±0.00031	±1.28	±0.00035	±1.40

* Analyses calculated on the basis of 24.70 mg. per sample taken as 100 per cent.

** Fiftieth-normal sulfuric acid solution was used.

TABLE VI.—THE EFFECT OF POTATO STARCH AND CHLOROPHYLL ON THE ASSAY OF ATROPINE.

Treatment of Combined Chloroform Extractions before Removing the Last 5 Cc. of Chloroform.	Newly Made Mixture of Potato Starch and Atropine.		Five-Month Old Mixture of Potato Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Potato Starch, Atropine and Chlorophyll.	
	Grams.	Per Cent.*	Grams.	Per Cent.*	Grams.	Per Cent.*
Added 5 cc. C_2H_5OH	0.02410	97.58	0.02469	99.92	0.02410	97.58
Added 5 cc. C_2H_5OH	0.02347	95.01	0.02428	98.28	0.02439	98.83
Added 5 cc. C_2H_5OH	0.02312	93.60	0.02439	98.83	0.02376	96.18
Added 5 cc. C_2H_5OH	0.02469	99.92	0.02312	93.60	0.02357	95.44
	Average	Average	Average	Average	Average	Average
	0.02384	96.53	0.02412	97.66	0.02396	97.01
	±0.00055	±2.21	±0.00050	±2.03	±0.00029	±1.20
Added 15 cc. H_2SO_4**	0.02469	99.92	0.02399	97.11	0.02399	97.11
Added 15 cc. H_2SO_4**	0.02376	96.18	0.02376	96.18	0.02410	97.58
Added 15 cc. H_2SO_4**	0.02410	97.58	0.02364	95.71	0.02469	99.92
Added 15 cc. H_2SO_4**	0.02410	97.58	0.02410	97.58	0.02469	99.92
	Average	Average	Average	Average	Average	Average
	0.02416	97.81	0.02387	96.64	0.02437	98.63
	±0.00026	±1.04	±0.00017	±0.70	±0.00032	±1.29

* Analyses calculated on the basis of 24.70 mg. per sample taken as 100 per cent.

** Fiftieth-normal sulfuric acid solution was used.

TABLE VII. THE EFFECT OF ARROW-ROOT STARCH AND CHLOROPHYLL ON THE ASSAY OF ATROPINE.

Treatment of Combined Chloroform Extractions before Removing the Last 5 Cc. of Chloroform.	Newly Made Mixture of Arrow-Root Starch and Atropine.		Five-Month Old Mixture of Arrow-Root Starch and Atropine. Atropine Returned.		Five-Month Old Mixture of Arrow-root Starch, Atropine and Chlorophyll.	
	Grams.	Per Cent.*	Grams.	Per Cent.*	Grams.	Per Cent.*
Added 5 cc. C_2H_5OH	0.02347	95.01	0.02410	97.58	0.02376	96.18
Added 5 cc. C_2H_5OH	0.02329	94.30	0.02439	98.83	0.02312	93.60
Added 5 cc. C_2H_5OH	0.02364	95.71	0.02312	93.60	0.02376	96.18
Added 5 cc. C_2H_5OH	0.02439	98.83	0.02376	96.18	0.02347	95.01
	Average	Average	Average	Average	Average	Average
	0.02370	95.96	0.02384	96.55	0,02353	95.24
	±0.00035	±1.43	±0.00040	±1.66	±0.00023	±0.94
Added 15 cc. H_2SO_4**	0.02439	98.83	0.02502	100.00	0.02474	100.00
Added 15 cc. H_2SO_4**	0.02428	98.28	0.02376	96.18	0.02387	96.64
Added 15 cc. H_2SO_4**	0.02474	100.00	0.02410	97.58	0.02439	98.83
Added 15 cc. H_2SO_4**	0.02474	100.00	0.02439	98.83	0.02427	98.28
	Average	Average	Average	Average	Average	Average
	0.02454	99.28	0.02432	98.15	0.02432	98.44
	±0.00020	±0.75	±0.00039	±1.27	±0.00025	±0.98

* Analyses calculated on the basis of 24.70 mg. per sample taken as 100 per cent.

** Fiftieth-normal sulfuric acid solution was used.

DISCUSSION AND SUMMARY.

1. The quality of the chloroform used (technical, dried technical or dried analytical grades) definitely influences the amount of alkaloid recovered from solutions of atropine and hyoscyamine in this solvent. It is suggested that this fact may clarify some of the contradictory statements in the literature.

2. Solutions of atropine and hyoscyamine in 95 per cent neutral alcohol are stable when heated on a water-bath for one hour. If 5 cc. of alcohol is added before the final few cc. of volatile solvent is evaporated from a chloroform solution of atropine or hyoscyamine, the decomposition of the alkaloidal residue when heated at

dryness on the water-bath is retarded. This confirms the work of Durrett (7) and others. However, the slight advantage of alcohol does not justify its use if analytical grade chloroform is employed for the assay process.

3. The decreased yield of the U. S. P. XI method is chiefly due to the removal of volatile basic substances, but is partly due to loss of alkaloids.

4. The alkaloids are more thoroughly extracted by the U. S. P. X process, as shown by the greater amounts of atropine returned from a fortified sample of powdered extract.

5. The U. S. P. X shake-out method removes more of the chlorophyll and resins which interfere in the U. S. P. XI extraction process. Concordant results are also easier to obtain. This confirms the work of the A. D. M. A. Contact Committee's Sub-Committee (4) and Hayden (9).

6. The most satisfactory results were obtained by using the U. S. P. X extraction method and then completing the assay by the U. S. P. XI process because: *First*, the alkaloids can be extracted with little difficulty; *second*, the assay can be completed in one day; *third*, the volatile bases, which would be calculated as alkaloid, are removed; *fourth*, concordant results can be obtained by using a good grade of chloroform; and *fifth*, the destruction of the alkaloids is less than the approximate error of the assay if analytical grade chloroform is used.

7. Experiments with "synthetic powdered extracts" indicate that atropine is not adsorbed to any appreciable extent by chlorophyll, with the possible exception of a mixture containing corn starch, atropine and chlorophyll. It should be noted, however, that this combination occurs in many powdered extracts.

8. Of the starches tested, only that from rice showed any evidence of adsorption of atropine during the five month test period.

9. Corn and rice starch are diluents from which atropine is difficult to extract. When wheat starch is used as the diluent, this difficulty is partly overcome.

10. Atropine may be readily extracted from mixtures containing potato or arrow-root starches. Neither of these form troublesome emulsions. They were the most satisfactory diluents examined.

The results summarized in 7, 8, 9 and 10 indicate that the type of starch used as a diluent affects the analyses, a marked relationship existing between the size of the starch granules and the efficiency of extraction.

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THE DETERMINATION OF MANDELIC ACID IN CALCIUM MANDELATE, MONOETHANOLAMINE MANDELATE AND ELIXIR OF MANDELIC ACID.*

BY ASA N. STEVENS[1] AND EDWARD J. HUGHES.[1]

Since Rosenheim (1) reported that mandelic acid had therapeutic properties there have been several (2), (3) methods proposed for its quantitative estimation. During the course of some experimental work we found a volumetric method for the determination of mandelic acid in calcium mandelate, monoethanolamine mandelate and elixir of mandelic acid which we believe to be both accurate and time-saving. In this method the mandelic acid is extracted with ether in acid solution and is subsequently titrated, directly, with tenth-normal barium hydroxide. The procedure is described as follows.

METHODS.

For Calcium Mandelate and Monoethanolamine Mandelate.—Place 0.25 Gm. of the sample, accurately weighed, in an automatic extraction apparatus, then add 50 cc. of distilled water and 1 cc. of hydrochloric acid. Assemble the apparatus on a steam-bath and completely extract with ether. Usually three hours is sufficient. At the end of this period dismantle the extraction equipment and remove the ether from the flask by evaporation on a steam-bath. Add to the residual liquid 25 cc. of neutral alcohol and 1 cc. of phenolphthalein T. S. Then titrate the solution with tenth-normal barium hydroxide. Each cc. of tenth-normal barium hydroxide corresponds to 0.0152 Gm. of mandelic acid.

For Elixir Mandelic Acid.—Place 10 cc. of the elixir in a 100 cc. volumetric flask and dilute to the mark with distilled water. Mix thoroughly and transfer 10 cc. of this solution to an automatic extraction apparatus. Then add 40 cc. of distilled water containing 1 cc. of hydrochloric acid. Test with litmus paper and if the solution is not acid, add sufficient hydrochloric acid to provide a distinctly acid reaction. Assemble the apparatus on a steam-bath and proceed as directed in the assay for calcium mandelate.

RESULTS.

TABLE I.—CALCIUM MANDELATE.

Sample No.	% Mandelic Acid Found.	Theoretical Amount Mandelic Acid %.	% Theoretical Amount Found.
1	88.51	88.30	100.20
2	87.87	88.30	99.51
3	88.51	88.30	100.20
4	87.87	88.30	99.51

TABLE II.—MONOETHANOLAMINE MANDELATE.

Sample No.	% Mandelic Acid Found.	Theoretical Amount Mandelic Acid %.	% Theoretical Amount Found.
1	71.51	71.36	100.2
2	71.20	71.36	99.7
3	71.50	71.36	100.2
4	71.20	71.36	99.7
5	71.84	71.36	100.6
6	72.07	71.36	100.9
7	72.07	71.36	100.9
8	72.71	71.36	101.8

*Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] Control Laboratories, Eli Lilly and Company.

TABLE III.—ELIXIR MANDELIC ACID.

Elixir No.	Mandelic Acid Found Gm./100 Cc.	Theoretical Amount Mandelic Acid Gm./100 Cc.	% Theoretical Amount Found.
1	0.2878	0.27	106.5
2	0.2789	0.27	103.2
3	0.2730	0.27	101.1
*4	0.525 (0.25 Gm. mandelic acid added to 3)	0.52	100.9

*0.25 Gram of pure mandelic acid was added to sample No. 4 in order to demonstrate that all of the mandelic acid had been accounted for in the assay.

SUMMARY.

(1) A convenient method is presented for determining mandelic acid in calcium mandelate, monoethanolamine mandelate and elixir of mandelic acid, which involves an ether extraction in acid solution and a direct titration by means of tenth-normal barium hydroxide solution.

(2) The varied application of the method gives promise that it may be of considerable value in estimating the amount of mandelic acid present in other salts of mandelic acid.

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POSSIBILITIES OF SYNONYMY IN GENUS DELPHINIUM.*,[1]

BY JOAN COONS AND C. W. BALLARD.[2]

There are many instances of disagreement as to the validity of several species of Delphinium as separate entities and of sub-species and varieties. P. A. Rydburg (1), Britton (2) and Small (3) classed *Delphinium carolinianum* and *Delphinium azureum* as one; while Gray (4) placed a question mark after this classifition. Phillips (5) stated that *Delphinium azureum* was once considered a variety of *carolinianum;* while Leonian (6) said that *carolinianum* was the *azureum* of one botanist and the *virescens* of another, and was probably an analog of *Delphinium azureum* from a different environment.

A similar diversity of opinion exists in regard to *Delphinium virescens*. Rydberg (7) classed *Penardi, virescens* and *albescens* as one; while Davis (8) classed *azureum* and *virescens* as synonyms of *carolinianum*; and Britton (9) stated that *albescens* is confused with *carolinianum*. Gray (4) also stated that *Penardi* has as synonyms both *Delphinium camporum* and *albescens*. Moreover, *Delphinium Nortonianum* is involved in this confusion.

* Presented before the Scientific Section, A. PH. A., Minneapolis meeting, 1938.

[1] A partial report of research in fulfilment of the requirements for the degree of Doctor of Pharmacy in Columbia University, College of Pharmacy.

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The attempts of some authors to give distinguishing characters are often refuted by the statements of others. One author (10) said that *albescens* differed from *carolinianum* in the color of the flower and stouter habit; but that its differentiation from *camporum* is not clear as *carolinianum* and *albescens* may have an erect spur, destroying this as a characteristic of *camporum*. An attempt to distinguish *virescens* from *carolinianum* by color of the corolla is open to question, for Perry (11) holds the range of both from white to blue is too broad. Perry also discards stoutness of habit and curvature of spur as distinguishing characteristics and said that it was difficult to establish real differences between *Nortonianum*, *Penardi* and *carolinianum*. Davis (9) classed *carolinianum*, *azureum* and *virescens* as one; while Chapman (12) does not believe that the wider-lobed leaves and larger greenish flowers of *azureum* as contrasted with *virescens*, sufficient to warrant separate specific rank. Mackenzie and Bush (13) hold that *Nortonianum* is most

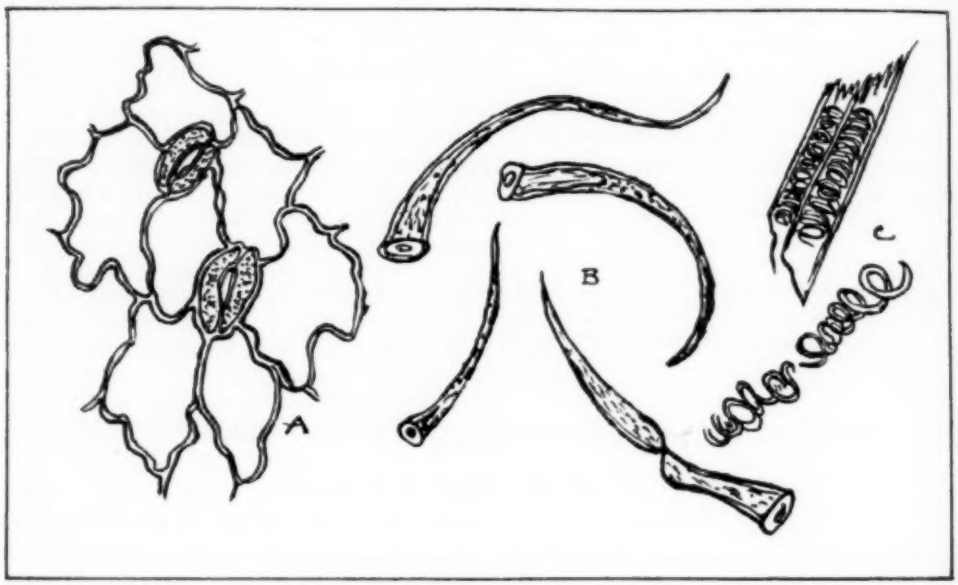

Fig. 1.—(*a*) epidermal cells with stomata; (*b*) trichomes; (*c*) vessels.

closely related to *carolinianum*, but with larger and more strongly rugose squamellate seeds, and more strongly ascending spur; and note that *albescens* is differentiated by deeper blue flowers. This is contradicted by Palmer and Steyermark (14) who state that the characteristics on which *Nortonianum* has been based merge with those of *azureum*, and it therefore should be treated as a variety of the latter.

The attempts to separate species by minor differences are not always satisfactory. The phrase "more or less" adds to the difficulty in that the "more" of one botanist may be the "less" of another. For example, in distinguishing *Delphinium Nortonianum* from *albescens*, Mackenzie and Bush (13) said that the former had deeper blue flowers and more strongly wing-margined seeds than the latter. A survey of the Delphinium specimens of the New York Botanical Gardens shows the typical situation. The folders of *Delphinium virescens* and *albescens* often bore both labels, or other labels, some of which were crossed out and others followed by a question mark. *Delphinium camporum* and *Penardi* were confused

with these; while *azureum* and *carolinianum* were mixed with each of the above as well as with each other.

Due to its inclusiveness, a genus description cannot be as definite as a species description, yet even here the range of variation is frequently broad enough to allow the formation of separate species where one would, perhaps, be better. This is particularly evident in the color range of flowers and the differences in the types of leaves. There are many differences to be found in morphological descriptions of the various species. Take, for example, the following parts of descriptions: flowers, azure blue, varying to white (8), green (16); follicles, oblong erect (8), either erect or spreading (16); spur, erect, horizontal or ascending (15), curved upward (4); sepals, often with brownish spot (8), sky blue or whitish tipped with brown (12); leaf-blades, with linear lobes (8), linear toothed or cleft segments (3), entire acute lobes (12). This serves to show the variability in description and is of importance in that it applies not only to *Delphinium camporum*, but to *Delphiniums albescens, virescens, carolinianum, azureum, Nortonianum* and *Penardi;* through claimed synonymy. Moreover, in cases where the several species are classed separately, the descriptions by one botanist are immediately refuted by the opinions of another. Search of the literature reveals specific examples of such cases, but lack of space prevents their being cited here.

In view of this chaotic situation, it was thought that histological evidence might be of value in species determination. A general microscopic examination was made of the several gross parts of the plant so that it might be determined which of these parts offers the greatest possibilities of histological variation; and it was decided to base the investigation upon variations in histological characters apparent in the leaf, particularly the variations in trichomes.

A preliminary examination of herbarium specimens from the herbaria of Columbia University, College of Pharmacy and the New York Botanical Garden substantiated the several opinions that *Delphinium carolinianum, azureum, virescens, albescens, camporum, Penardi* and *Nortonianum* may in reality be one species. To forestall the possible claim that perhaps all the Delphiniums are alike as to histological structure, several other species of Delphinium (not included in this paper) were examined. It was found that the species discussed above coincide with one another in their histological characteristics and thus constitute a group. Furthermore, it was found that the group characters were different from those of other groups. In the several other groups the various members too are identical with one another, but each group can be distinguished from the others. Correlated with morphological characters, this substantiates the idea that there is no valid basis for establishing the many sub-species noted in the literature, and concerning which there is so much contention.

The possibilities of the particular specimens under observation being exceptions and not typical in the matter of histological structure are minimized by the extensive number examined and their wide range of habitat. Since these characters hold true in plants of a given species from warm sections of the west with low altitudes, from damp eastern parts of the country, and from cold northern places of high altitudes, the factor of climatic conditions may be eliminated in this instance.

The trichomes may be described as slender, slightly curved, non-glandular and unicellular. The walls are of medium thickness and the surface is rough or papil-

lose. The trichome varies from almost colorless to a pale green or greenish shade. These trichomes are important in that they serve as a distinction for the establishing of several groups, the following variations being found: glandular only, non-glandular only, non-glandular and glandular, and each of these may show surface variations as rough or smooth, and finally, in a few species, trichomes are lacking.

A comparatively few exceptions to the foregoing histological structures were noted in the herbarium specimens, but these would seem to be the result of incorrect labeling. Sections were prepared from thirty-nine different specimens of *Delphinium virescens*, including those first labeled *azureum*, *carolinianum* and *albescens*, all of which had been finally relabeled *virescens*. In all but three cases there was a constancy as regards microscopic features, and in the three specimens not conforming to the rule, the presence of glandular hairs places them in one of my other groups.

Since most of the *Delphinium albescens* had been finally relabeled *virescens*, there remained only a few bearing the title *albescens*. Five of six specimens were true to form, the sixth differing in that there were no hairs apparent. Although some of the twenty-two plants labeled *Delphinium azureum* were in the files under the title *carolinianum*, all bore, each on its own sheet, the name *azureum*. In all but one, the histological characters were found to be uniform and to coincide with the general description given for the *Delphinium virescens* group—the one exception having larger and more papillose hairs.

Twenty-one specimens labeled *Delphinium carolinianum* were examined and without exception showed typical and uniform characters. This situation also held true in the cases of *Delphinium Nortonianum* (seven specimens), of *Delphinium Penardi* (ten specimens), and of *Delphinium camporum* (five specimens). The specimens of *camporum* bore a note by R. Martin to the effect that he considered them all to be *Delphinium virescens*.

Since the exceptions were so few, and in most cases bore evidence of several relabelings, it would appear probable that the difference is due rather to incorrect determination on the part of the morphologist than to lack of consistency in structures in a group.

As a result of this investigation there appears justification for considering *Delphinium carolinianum*, *Delphinium azureum*, *Delphinium albescens*, *Delphinium virescens*, *Delphinium camporum*, *Delphinium Penardi* and *Delphinium Nortonianum* as synonyms of one another rather than as separate species. It is realized that this work is far from complete, and is being continued.

It is interesting to note that Robert F. Martin, Junior Botanist of the U. S. Department of Agriculture, is engaged in an investigation of the genus Delphinium coincident with this survey.

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A STUDY OF SOFT SOAP AND SOAPY PREPARATIONS MADE BY A COLD PROCESS.*

DAVID W. O'DAY[1] AND JAMES W. JONES.[2]

SOFT SOAP LINIMENT.

In 1935 Cox (1) suggested that cottonseed oil be used in place of linseed oil in the preparation of the official soft soap and soft soap liniment. The use of linseed oil soap in the preparation of the liniment was objected to because of the persistent linseed oil odor which remained after its use as a detergent. This odor remains even after the odor of lavender has been removed. Another objection to the U. S. P. X. formula for the liniment was that the preparation contained more alcohol than was necessary.

The following formula was proposed to overcome the objections mentioned above:

Cottonseed oil	305 cc.	Dekanormal Solution of Pot. Hydroxide	65 cc.
Oil of Lavender	20 cc.	Dekanormal Solution of Sod. Hydroxide	32 cc.
Alcohol	200 cc.	Water, a sufficient quantity to make	1000 cc.

Mix the cottonseed oil, oil of lavender, alcohol and the dekanormal solutions. When a clear solution results, add enough water to make the product measure 1000 cc.

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* Presented before the Section on Practical Pharmacy and Dispensing, A. PH. A., Minneapolis meeting, 1938.

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This formula has been used very successfully in the preparation of large quantities of liniment of soft soap for use at the hospitals connected with the State University of Iowa. It was thought that a study of the appearance and properties of liniment of soft soap prepared from various vegetable oils by the Cox Method might yield more extensive information concerning the possibilities of saponifying these oils by a cold process and might show the advantages of using certain oils other than linseed oil or cottonseed oil in its preparation.

To obtain this information the oils listed below were used in preparing the liniment according to the Cox Method given above. The amount of alkali used was varied slightly according to the composition of the oil being used in compounding the preparation. Since this liniment is used very extensively as a detergent, it was thought advisable to compare the lathering properties of the liniments prepared from the different oils. The appearance and lathering properties of these preparations are listed in Table I.

TABLE I.—LINIMENT OF SOFT SOAP.

Preparation from.	Color	Lathering Properties and Cleansing Action.	Remarks.
Linseed oil	Amber	Fairly good. Yellowish foam, fairly abundant	Odor of linseed oil remains after using
Soya bean oil	Amber	Good. Abundant foam which is fairly lasting	Some odor of oil after using
Cottonseed oil	Medium light amber	Good. Abundant foaming	No definite odor of the oil. Cost reasonable
Sesame oil	Medium light amber	Good. Bubbles large	No advantages. Cost high
Almond oil	Light amber	Fairly good. Bubbles large	No advantages. Cost high
Corn oil	Medium light amber	Good. Quick forming and abundant lather	No definite odor of oil. Cost very reasonable
Peanut oil	Very light amber	Slow forming, heavy lather. Very lasting	Soap not formed very readily. Chief advantage is permanence of lather

It may be seen from Table I that the liniments prepared from sesame oil, almond oil and peanut oil offer no special advantages over those prepared from cottonseed oil and corn oil. The liniment prepared from soya bean oil has a good appearance, but some odor of the oil remains after a lather formed by the liniment has been rinsed away with water. However, this odor is neither as strong nor as objectionable as the odor of the preparation made from linseed oil. By using soya bean oil in place of linseed oil the cost of the preparation is decreased. Corn oil is very reasonable in price and appears to make a liniment equal to or superior to the preparation made with cottonseed oil.

SOFT SOAP.

A new formula for soft soap proposed by Cox specifies that cottonseed oil shall be used in place of linseed oil. The objection to linseed oil soaps is, as mentioned before, the persistent odor, while the objection to the use of cottonseed oil in making the soap has been the difficulty experienced in saponifying the oil. Cox has shown that this difficulty is eliminated if the proper method is used to make this soap. If too much water is present, the saponification process becomes more difficult. If very concentrated solutions of the alkalies are added to cottonseed oil, it is possible to bring about complete saponification without the use of heat.

The following formula proposed by Cox eliminates the use of alcohol or glycerin:

Cottonseed oil	430 Gm.
Dekanormal Solution of Pot. Hydroxide	100 cc.
Dekanormal Solution of Sod. Hydroxide	50 cc.
Water, a sufficient quantity to make	1000 Gm.

Mix the dekanormal solutions with the oil. Stir occasionally during three hours, then set aside for twenty-four hours. Add warm water enough to make the product weigh 1000 Gm

This general formula was used in preparing soft soaps from the oils listed in Table II. The proper amount of concentrated alkali was added to the oil, and the mixture was stirred with a mechanical stirrer until a thick creamy emulsion was formed. Then, the emulsified mixture was set aside for twenty-four hours without heating.

(Continued from above. Same samples.)

Preparation Made from.	Lathering Properties.	Remarks.
Linseed oil	Heavy foam, not very voluminous	Odor persistent, sometimes objectionable
Soya bean oil	Rather quick-forming and copious lather. Fairly heavy	Odor fairly distinct, but not objectionable. Oil low priced
Cottonseed oil	Quick-forming lather. Rather thick and abundant	Oil fairly cheap
Sesame oil	Quick-forming lather. Rather large bubbles	Oil too expensive for this preparation
Almond oil	Quick-forming lather. Rather large bubbles	Oil too expensive for this preparation
Corn oil	Rather quick-forming and thick lather	Oil relatively cheap
Peanut oil	Slow-forming, heavy lather with small bubbles	Difficult to saponify

At the end of this period all the oils except peanut oil were completely saponified. Unlike the other oils employed, peanut oil did not form a homogeneous creamy emulsion when stirred and after twenty-four hours standing, some of the oil remained unsaponified. By rapid stirring it was possible to disperse the unsaponified oil in the semi-solid portion of the mixture; then the preparation was set aside for another twenty-four hours. At the end of this time the mixture was tested and showed complete saponification.

The method of saponification without the use of external heat seems most suitable for those oils which upon the addition of alkali form a thick homogeneous emulsion in which the oil is dispersed in fine globules by vigorous agitation. It is quite logical that the more surface of the oil exposed to the action of the alkali, the more readily the oil will be saponified.

The physical characteristics of the soaps made by this process are listed in Table II. From the information given in the table it can be seen that corn oil and soya bean oil, as well as cottonseed oil, may be used to make a very good quality of soft soap that is not exorbitant in price. Furthermore, no difficulty was experienced in saponifying these oils which formed soaps with a superior appearance without the use of heat. As noted in the table, some of the other oils make nice appearing soft soaps, but they are too expensive for use in this preparation.

TABLE II.—SOFT SOAP.

Preparation Made From.	Color.	Consistency.	Odor.
Linseed oil	Greenish amber	Soft	Definite odor of linseed oil
Soya bean oil	Light amber	Soft	Retains some odor of the oil
Cottonseed oil	Very light amber	Soft	Odor of oil not distinct
Sesame oil	Very light amber	Soft	Odor of oil not distinct
Almond oil	White or very light amber	Quite soft	Odor of oil not distinct
Corn oil	Yellowish light amber	Quite soft	Odor of oil not distinct
Peanut oil	Almost colorless. Tinge of amber	Stiff jelly-like mass	Odor of oil not distinct

CAMPHOR AND SOAP LINIMENT.

Jordan (2) and Cox (1) have suggested that camphor and soap liniment be prepared by a method in which the liniment is made from the required amount of olive oil and sodium hydroxide needed to make the amount of castile soap specified in the formula. Variations in the castile soap used cause variations in this liniment when it is prepared by the U. S. P. X formula.

The following formula prepared by Cox is compounded without difficulty and gives only a small amount of precipitate:

Olive oil	64 cc.	Camphor	45 Gm.
Oil of Rosemary	10 cc.	Dekanormal Solution of Sod. Hydroxide	18 cc.
Alcohol	700 cc.	Water, a sufficient quantity to make	1000 cc.

Dissolve the camphor and the oil of rosemary in the alcohol, add the olive oil, then the dekanormal solution of sodium hydroxide. Stir occasionally and when clear add the water. After twenty-four hours filter.

The small amount of glycerin which is formed upon saponification of the oil is not objectionable in the preparation.

Using the above formula, samples of the liniment were prepared using oleic acid and the various oils listed in Table III. The amount of alkali was altered slightly according to the product being saponified. The amount of precipitate formed after twenty-four hours standing was not large in any case. The observations made concerning these preparations are recorded in Table III.

TABLE III.—CAMPHOR AND SOAP LINIMENT.

Preparation Made from.	Amount of Precipitate Formed.	Color.	Remarks.
Olive oil	Small amount, flocculent	Almost colorless, greenish yellow tinge	Superior preparation
Cottonseed oil	Very small amount, fine	Almost colorless, yellowish tinge	Odor and appearance good
Almond oil	Very small amount	Almost colorless, very slight yellowish tinge	Odor and appearance good
Corn oil	Very small amount	Almost colorless, yellowish tinge	Odor and appearance very good
Soya bean oil	Small amount, flocculent	Almost colorless, yellowish tinge	Odor and appearance good
Peanut oil	Large amount of soap not in solution	Soap in solution almost colorless	Soap too hard for this preparation
Sesame oil	Small amount, fine	Colorless	Odor and appearance good
Oleic acid	Fairly small amount of precipitate, flocculent	Light amber	Appearance fair, some odor of oleic acid

Oleic acid was readily converted to sodium oleate, but a flocculent precipitate formed during the process of compounding the liniment. The odor of this liniment prepared from the acid was slightly harsh. The product obtained by the use of olive oil was superior in all respects. Corn oil formed a very desirable product, while the preparations formed by using cottonseed oil and soya bean oil were satisfactory. Peanut oil was completely unsatisfactory for the preparation of this liniment.

SAPONATED SOLUTION OF CRESOL.

Objections have been raised in regard to the dark color of Saponated Solution of Cresol made from linseed oil according to the official formula. Hilton (3) suggested a formula for the preparation of this solution in which oleic acid was used in place of linseed oil. The preparation made by this formula can easily be made in a period of 15 minutes and is much lighter in color than the official product. Jordan (2) in 1919 suggested an alteration in the directions for the preparation of the solution. According to Jordan's directions, the alkali was added to the linseed oil and the saponification process was completed before the cresol was added to the preparation. The product obtained by this method of preparation was lighter in color than the solution prepared by the official process.

Although the alkali used according to Jordan's directions was concentrated, it was thought that an alkali of a greater concentration might be used more advantageously in the preparation of saponated cresol solution without the use of heat. The alkali solution used in making this preparation according to the present official directions is quite concentrated. It was found that by altering the directions for preparation given in the U. S. P. XI saponated cresol solution could be prepared without the use of heat and the resulting product was much lighter in color. The amounts of the ingredients used were the same as those called for in the U. S. P. XI and the directions were altered as follows:

The concentrated alkali was added to linseed oil containing one per cent of cresol, and the mixture was stirred with a mechanical stirrer until a thick creamy emulsion was formed, then the mixture was set aside for twenty-four hours. At the end of this time the cresol (minus the amount used above as a catalyst) was added to the soap which was formed, and the mixture was agitated by means of a mechanical stirrer until a clear solution resulted. Finally, enough distilled water was added to make the solution the proper strength. The cresol and soap mix more readily if a little heat is applied, but any excessive use of heat results in a darkened solution.

In the above reaction the one per cent of cresol was added as a catalyst. Roschdestwensky (4) discovered that the reaction between alkali and oils is increased greatly by the addition of one per cent of aromatic hydrocarbons of phenolic character. Oils which require long periods of time for saponification are readily saponified in a much shorter time if the proper amount of cresol is added to aid the reaction. When large amounts of cresol are added, the reaction does not proceed any faster and the addition of very large amounts, such as the total amount used in the preparation of the cresol solution, seem to greatly retard rather than favor saponification. Other catalysts such as thymol, phenol, hydroquinone and betanaphthol can be used to advantage in preparing soft soap providing that the presence of these substances in the finished product is not considered objectionable.

In order that the character of the cresol solutions made by the use of other oils and by different methods might be determined, 100-cc. samples of this solution were made using oleic acid and the oils listed in Table IV. Two samples were made from each oil. The hot method (regular official method) was used in the preparation of one sample and the cold method (revised method) was used in the preparation of the other. The colors of the preparations made by each method and some other observations are given in Table IV.

TABLE IV.—SAPONATED SOLUTION OF CRESOL.

Preparation Made from.	Hot Method Color.	Cold Method Color.	Remarks.
Linseed oil	Dark reddish brown	Amber	Objections—dark color and persistent odor
Soya bean oil	Reddish brown	Amber	Makes a nice appearing preparation at a low cost
Cottonseed oil	Dark reddish brown	Amber	Quite turbid when added to tap water
Castor oil	Reddish brown	Amber	Quite turbid when added to tap water
Corn oil	Dark reddish brown	Amber	When prepared by cold method, it makes a nice appearing preparation.
Sesame oil	Dark reddish brown	Amber	Too expensive, no special advantages
Peanut oil	Dark reddish brown	Medium dark amber	Too expensive, harder to saponify
Oleic acid	Not used	Dark amber	No advantages except ease of preparation, cost prohibitive

Castor oil which was formerly used in preparing this solution according to the official British formula seems to offer no distinct advantages. All of the solutions made by both methods mixed well with distilled water and gave a clear solution. However when a hard water was used, the preparations made from cottonseed oil and castor oil seemed to give more turbidity than the preparations made from the other oils. The solution made by using oleic acid offered no advantages except ease and quickness of preparation. Oleic acid is more expensive than many of the vegetable oils. Sesame oil and peanut oil offer no advantages and are too expensive for use in such a solution. Soya bean oil forms a nice appearing solution when made by either the hot or cold method and may be purchased at a price below that for linseed oil. Corn oil makes an amber colored solution when the cold method is used, but the solution is much darker if the hot method is employed.

In another experiment a mixture of the alkalies was added to a mixture of linseed oil and cresol in a bottle, and the combined mixture was vigorously shaken for a short time. Then the preparation was set aside and shaken occasionally. At the end of ten days without the use of heat the sample gave a clear solution when added to nine times its volume of distilled water. Sufficient distilled water was then added to dilute the preparation to the proper strength. This method of preparation might be advantageous where ease of preparation is desired and where the preparation is not needed in a hurry.

If the linseed oil and alkalies are mixed until a creamy emulsion is formed and then the cresol is added without waiting for complete saponification to take place, the mixture formed will give a clear solution with distilled water after standing for a period of four days. It is interesting to note that the solutions prepared by the last two methods have a darker color than those prepared by the regular revised formula.

If cresol is mixed with an equal weight of any of the soft soaps prepared by the Cox Method and solution is effected, the resulting preparation will give a clear solution when mixed with distilled water. Saponated Solution of Cresol could be made by this method when a sufficient quantity of soft soap is available.

CONCLUSIONS.

1. The official soap preparations made by the cold saponification process all possess a better appearance than those prepared by the official processes.
2. Soya bean oil or corn oil form excellent products, devoid of objectionable odor and low in price.
3. The use of heat in the saponification process tends to produce darkened products.
4. Saponated Solution of Cresol may be prepared without the application of heat and the preparations made by the cold process are much lighter in color.

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THE RECOVERY OF SILVER FROM EXHAUSTED FIXING BATHS BY PRECIPITATION WITH SULFURATED POTASH.*

A PROFITABLE PROCEDURE FOR THE HOSPITAL PHARMACIST.

BY EDWARD C. WATTS.[1]

Although the recovery of silver from exhausted fixing bath solutions has been known to be practical and worthwhile for a great number of years, this procedure still seems to be overlooked or given an insufficient amount of attention by hospitals throughout the country. This should not be so, for this process is the means of effecting a considerable reduction in the operating budget. With all the agitation for more and better hospitalization at a lower cost it behooves every one connected with this vast enterprise to know how and where costs may be reduced. Hospital pharmacists because of their knowledge of Chemistry will appreciate that this reclamation is, after all, comparatively simple and inexpensive.

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* Presented before the Sub-Section on Hospital Pharmacy, A. Ph. A., Minneapolis meeting, 1938.

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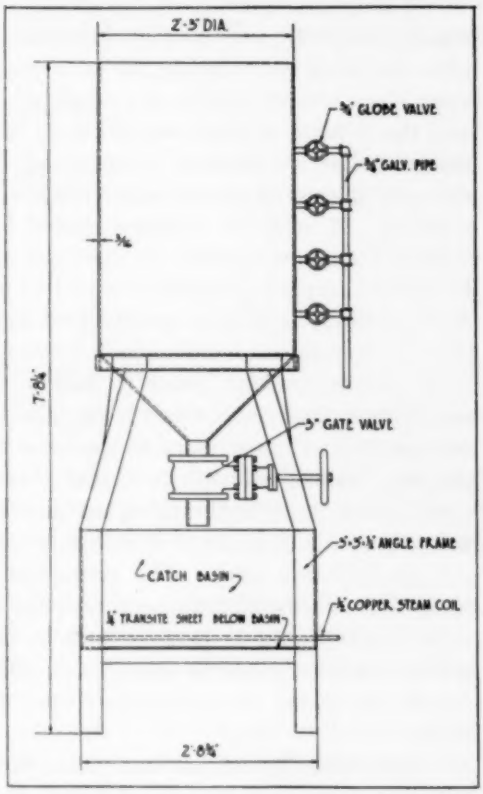
At University Hospital, prior to 1930 there had been sporadic attempts to recover silver by one process or another, but due to physical expansion and changes in personnel in this unit of the University no concerted effort was made to continue the work. By 1936 the volume of photographic solutions which were being used had so increased that it became quite obvious that a considerable amount of valuable material was being allowed to go to waste through the drains each week. About this time plans were developed for the enlargement of the Pharmaceutical Laboratory and it was decided to entrust this department with the responsibility for this recovery. In as much as this department was the place of origin for all fresh photographic solutions this decision was quite logical.

As the minimum amount of solution to be handled each week was determined to be no less than forty gallons, it was realized that some adequate and convenient piece of apparatus was necessary. A suggestion in the article by Crabtree and Ross (3) provided the basis for the design of the precipitating tank and evaporator which is shown in the diagram. This apparatus made of three quarter inch sheet metal was built to our order in the shops of the University's Buildings and Grounds Department at a cost of $150.00.



The decision to use a sulfide precipitation process was arrived at after a thorough consideration of the various methods of recovery which are recommended for silver. The amount of exhausted fixing bath to be handled in this instance was relatively large therefore a process which was prompt and economical was desirable. This we believe the sulfide precipitation method to be.

About the hospital, there are no less than five locations to which the pharmacy supplies photographic solutions and at which the exhausted fixing bath accumulates. These locations, with the amounts of solution accumulating, are as follows:

(1) X-ray department dark room, 40 to 60 gallons weekly; (2) Heart station dark room, 20 gallons monthly; (3) Photographers dark room, 5 gallons weekly; (4) Oral surgery X-ray dark room, 5 gallons weekly; (5) Photostat room, 30 gallons monthly.

It is readily seen that the greatest source of supply is the X-ray dark room. The fixing bath tanks in this location are pumped out weekly, the exhausted solution transported to the Pharmaceutical Laboratory and transferred to the precipitating tank, where the silver is thrown out of solution as silver sulfide. This

reaction in alkaline solution is, for all practical purposes, quantitative. The exhausted solution from the other locations is brought in for disposal at irregular intervals whenever convenient.

SUMMARY OF INCOME AND EXPENSE, MARCH 1936–OCTOBER 1937.

Silver sludge precipitated	525 lbs.	
Metallic silver equivalent	1988.6 oz.	
Received from sale of above silver		852.13
Refining charges at 10%	85.20	
350 lbs. sulfurated potash at 22¢	77.00	
Total	$162.20	162.20
Income derived from sale of silver		$689.93

The greater portion of the solution which is received in the laboratory is already alkaline by reason of the fact that enough developing solution is carried over into the fixing bath during the processing of the films to make it so. This, however, is not always true, as this condition is dependent on the dark room technicians and the volume of work which has to be handled in each dark room. The pharmacist before attempting to carry out the precipitation should, therefore, determine by the use of litmus paper whether he is dealing with an acid or an alkaline solution. If acid, the solution should be rendered alkaline by the addition of a sufficient amount of fifty per cent sodium hydroxide solution. This is necessary to insure complete precipitation and to prevent the liberation of hydrogen sulfide. At this point the silver is precipitated as silver sulfide by the addition of a fifty per cent solution of sulfurated potash (Potassa Sulfurata U. S. P.). This we find to be more economical and easier to handle than sodium sulfide, which is more commonly recommended. For a forty gallon lot of solution from our X-ray dark room we usually find it necessary to use from 2,000 to 2,500 cubic centimeters of the fifty per cent sulfide solution to insure a complete precipitation. After testing the supernatant liquid and making certain that all the silver has been precipitated the waste liquid is then allowed to flow to the drain through one of the side valves of the precipitating tank. The particular valve to be used is determined by the level of the accumulated precipitate, the object, of course, being to remove as much supernatant liquid as possible and to retain all the precipitate. No attempt is made to wash the precipitate. It is, therefore, not finally obtained as pure silver sulfide but rather as a mixture of the sulfide and the salts of the fixing bath solution.

When a sufficient amount of the precipitate has collected and as much liquid has been disposed of through the drain as is possible, the precipitate is then dropped (with care to avoid splattering) through the gate valve into the evaporator.

Evaporation is hastened by the use of a steam coil and is allowed to proceed at will until the precipitate is thoroughly dried. Some puddling is necessary to keep the surface free of crust, which, of course, hinders the evaporation. When entirely free of moisture the silver residue is shovelled from the evaporator, packed and shipped to a refinery. Refining charges are quite reasonable and we do not feel that it would be economical to consider the reduction to metallic silver as a part of our process.

During the period from March 1936 to October 1937 there was collected five hundred and twenty-five pounds of impure silver sulfide which represented 1998.6

ounces of metallic silver. This at current market prices was valued at $852.13. Refining charges at ten per cent amounted to $85.20. This left as revenue from the sale of the silver precipitate the sum of $766.93. During the same period we used three hundred and fifty pounds of sulfurated potash. This at twenty-two cents per pound (in 100 lb. drums) cost $77.00. As the amount of alkali needed was practically insignificant the latter figure represents the total cost of chemicals needed. Deducting this amount from the net amount of cash received, we had left $689.93 as the return for our efforts. This amount we feel is decidedly worthwhile.

CONCLUSION.

The recovery of silver from exhausted fixing bath solutions by precipitation with sulfurated potash is a practical and profitable procedure, which any hospital pharmacist, who has even as little as five gallons of solution per week, to work with, should be interested in carrying out.

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STOCK CONTROL IN THE HOSPITAL PHARMACY.*

BY MARY E. BOWEN.[1]

One of the many problems with which hospital pharmacists have to deal is that of stock control. The number of items which must be available in the pharmacy at all times, though perhaps used only once in several months, runs into an amazingly large figure. The rise and fall in the demand for certain items which follows in the wake of the pharmaceutical detail men, makes this problem at times an exceedingly vexing one.

The general purchasing agent for an institution can tell from the records how many forceps, clips, yards of gauze and even how many bushels of potatoes will be needed for a given period of time and gauges his purchases accordingly. Our problem is not quite so simple.

However, the plan which we are now using aids a great deal in regulating purchases according to demand, and in keeping an adequate supply at all times to meet any ordinary circumstance. The two major points in this plan are a reserve or minimum stock, and a card file record of each purchase of each item stocked.

Each item when put in stock is given a minimum stock level which is noted on the container, or, in the case of individually packaged products such as biologicals, marked on the number of packages comprising this minimum. With most drugs and chemicals we use dispensing bottles for the routine work. These must be refilled when empty from the bulk containers and in this way the level of the bulk stock is watched more closely than it would be if each order was given out from this

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[1] Chief pharmacist, Hurley Hospital, Flint, Mich.

supply. In the instances where the total stock is too small to warrant a reserve supply, the minimum stock level is noted on the original container or on the shelf bottle to which the stock is transferred at the time of arrival. In all cases when the minimum level is reached, the card for that particular item is pulled from the active file and put into the section marked "Wants."

It is our custom to place orders with certain firms once a week. When the salesman comes it is only necessary to go through the cards in the want section of the file, pick out those for his company and place the complete order. Since the amounts previously ordered, together with the prices, are on the cards, the placing of the order becomes a simple matter. It also saves time, since it eliminates a hurried but often incomplete check of the stock with the salesman present. The odd items which are apt to make up single orders are cleared from the file by the end of each week and the orders placed with the proper firms.

Our card file system is made up of a three by five card for each item carried in stock. These cards, which are especially printed for this purpose, have eight columns with headings for the date, order number, firm, amount, unit of quantity, cost price, cost per Gm. or mil, and selling price (Fig. 1). The cards are titled with

H. T. CODEINE PHOSPHATE, 0.032 GM.

Date.	Req.	Firm.	Quan.	Unit.	Cost.	U. G. M.	Sell.
6–1	12345	"A"	5	M	20.00	.02	

Fig. 1.—Stock purchase record.

the English official name of the drug whenever possible. All types of preparations such as ampules, capsules and so on are segregated, titled as such and filed accordingly.

The date, firm and amount ordered are entered on the card at the time the order is placed. The remaining information is filled in after the material has been received, checked and the invoice approved. After these final entries are made, the card is returned to the active file.

By means of this card system an instantly available record of all purchases of all items is always at one's fingertips. It is easy to think something has been ordered just recently, or that a larger unit quantity might be an economical buy, when actually neither of these conditions may be true. But, with a quick glance at the card all of this information is to be had. By noting the amounts ordered and the frequency with which they have been reordered, it is easy to ascertain whether a larger amount is advisable or whether it would be so slow in turn-over that the slight monetary advantage would be lost. The records of the prices as they vary from time to time serve as a check when prices are requested for future orders.

All of our standard drugs and chemicals are purchased on bid. The requests for prices go only to reputable firms, however, since it is penny-wise and pound-foolish to buy, just because the price is attractive, from someone in whose merchandise you have not the utmost confidence. The "price cutters" are generally those firms whose reputations for quality are none too good.

As a general rule new products are not stocked until the number of requests has shown that they will be used. Very often these new items are merely the same as

something already in stock under some other trade name. When this is the case, we notify the physician that we have A's product not B's in stock and secure his permission to use that. In this way we cut down the number of items carried and in so far as possible avoid duplications. We may, at a future date, change to B's product for our stock but we do not carry both at one time. Again the card is of assistance since it shows at a glance any differences in price, making it possible to buy to the greatest advantage.

The narcotic drugs form a separate and individual problem in that a perpetual inventory must be kept at all times.

A special loose leaf book with special forms is used to keep these narcotic records (Figs. 2 and 3). Each size of tablet, each kind of preparation has a section de-

H. T. CODEINE PHOSPHATE, 0.032 GM.

Date.	To Whom Dispensed.	Amount.	Balance 1000.
6–15	4th floor	25	975

Fig. 2.—Daily record sheet.

H. T. CODEINE PHOSPHATE, 0.032 GM.

Date.	Made Up.	Used.	Balance 000.
6–15	Received from "A"—Lot No. 23456		
	10 bottles, 500 each (5000)		5000
	Made up 40 bottles, 25's.	1000	4000

Fig. 3.—Narcotic stock record.

voted to its stock record. When a purchase is made, the amount purchased together with the manufacturer's name and the lot number is entered. If there has been a previous balance, the new amount is added to the old balance and the new balance posted. As each withdrawal is made, the date, amount used and the purpose for which it is used are all entered. The amount used is subtracted from the old balance and the new balance posted. Once a month the actual stock is checked to verify the book balance.

In the instances of the hypodermic tablets which are used on the floors, a slight variation of this system is used. When a purchase is made, the number of bottles, lot numbers, and so forth are recorded together with the new balance. Since our tablets are dispensed to the floors in bottles of twenty-five tablets, each time twenty or forty of these bottles are counted out this is noted as such and the total number subtracted from the old balance. At the same time this number is added to the previous balance on the daily record sheet. As these bottles are returned to the pharmacy empty, with a complete record of the disposition of the tablets on the floor, (Fig. 4) a new, full bottle is given to the floor and the number of tablets noted on the daily record sheet as having been dispensed to that floor and subtracted from the balance. The narcotic record sheets which are returned from the floors are then filed for inspection at any time by the Federal investigators. Dispensing the tablets in bottles of twenty-five does not mean that this is the total number of tablets

which can be had in stock on any one floor. In fact, most of the floors have at least two bottles of twenty-five tablets. This is better than giving them one bottle of fifty tablets since there is always a reserve supply; and the excuse that one floor had to borrow from another because they ran short of tablets no longer holds because at the first possible time after a bottle is emptied it is to be replaced with a full one. The total number of tablets in stock on the floors varies from time to

HARRISON LAW DRUG SHEET

U. S. Reg. No. _____

NOTE: For every dose of Opium or Cocoa Leaves, in any form, Opium, Morphine, Codeine, Laudanum, Heroin, Cocaine, etc., a full line of this sheet must be filled out. Not at some future time, but immediately when the dose is given.

FAILURE TO DO IS PUNISHABLE UNDER THE LAW BY A FINE OR IMPRISONMENT OR BOTH.

H. T. CODEINE PHOSPHATE, 0.032 GM. (GR. 1/2).

Date.							
Day.	Hour.	Name.	Location.	Doctor.	Drugs.	Amt.	Administered by.
6–15	1 P.M.	Smith, John	415–2	Jones	Codeine	Gr. †	Miss Brown

Total used 25; tablets received 25; signed nurse receiving; date 6–26–38.

Fig. 4.

time with the needs of any particular floor at any particular time. It may be that fifty tablets will hold the floor nicely over a twenty-four hour period, then emergencies may cause the need to rise to seventy-five tablets. These extra tablets to cover such an emergency need are simply given as temporary stock with the understanding that as soon as the immediate need for the increased number ceases the stock is to be reduced to the minimum. This is to avoid the piling up of stocks at any one time and keeps the number of narcotic tablets out at the minimum at all times.

If the number of tablets used by an institution is large enough to warrant having a private formula made up, the system in use by the University of Michigan Hospital in Ann Arbor is one which should be mentioned. In order to avoid all danger of mixing morphine, codeine and pantopon, which are the standard ones stocked on the floors, a system of colors is used. The labels on the bottles and the sheets on which the use of the tablets is recorded are printed in colors to correspond with the colors of the tablets. The codeine tablets are white, the sheets and labels white with blue lettering; the pantopon tablets are their natural grayish color, the sheets and labels being grayish blue to correspond; the morphine tablets are made up as a special formula colored a pale yet distinct yellow—again the sheets and labels are colored to match. With these three distinct colors, there is little if any chance that a morphine tablet may be mistakenly given for a codeine tablet, or that its use may be posted on the wrong sheet thereby upsetting the balance. This is a system which might well be used by any institution using enough of any one kind of tablet to have them made up in color. Drug manufacturers might make a note of this suggestion and offer one of their tablets in color for hospital use.

Both this system of narcotic records and of general stock control have been found to be most satisfactory and are sufficiently flexible to suit the situation in an institution of any size. In fact, neither of these systems was in use at Hurley Hospital two years ago. They were put into use as modifications of the systems in use by the University of Michigan Hospital, which is an institution having three times the number of beds as Hurley Hospital, and whose whole system of management is very different from that of Hurley Hospital. In the long run, the time it takes to keep these records is time saved, since it takes less time to check stock, write orders and see salesmen. It also means that many an embarrassing situation because of stock shortage is avoided.

ADVANCEMENT OF PHARMACEUTICAL EDUCATION.*

BY FREDERICK J. WULLING.[1]

Through the many years I have devoted to the advancement of education I have learned that the source of the initiative of such activity is principally the educators themselves. They have had not only very little help from other sources, but were constantly confronted with opposition from many directions. Some of this opposition was formidable; some was deplorable, because it was based upon self-interest; and in still other cases it was to be considered, discussed, debated, and out of it often came helpful conviction and support. Every worthwhile forward step should be, and usually is, a collective one. The initiative usually comes from one or more individuals, who work upon the minds of many in executive and resourceful ways, and if they can convince the many, collective and binding action follows. The wisdom or the contrary, of the collective mind depends upon the preponderance or the lack of wisdom of the individual minds composing the composite mind. It is the well-rooted belief that a majority of individual minds, if they are agreed and unanimous upon the same subject matter, are wiser collectively than a minority and so the action of the majority prevails and becomes binding upon all. For an individual mind to sway or convince a majority is not, as a rule, an easy task, but that is the way nearly all forward steps are begun. To do this requires time, often very much time, even of many individual minds. It took about forty years to overcome the opposition to the Pure Food and Drug Law because of the self-interest of the minority. In education there is less self-interest than in the economic or industrial world and hence educational progress should be more rapid than it is. Why is that so? Because, it seems to me, not a sufficient number of educators put their minds upon the executive or administrative aspects of education. Every faculty member, not only the dean, should definitely train himself to become a very efficient administrator within the scope of his own work. Education, indeed every profession, needs a minimum of good business management in every division and as a whole. This minimum is constantly increasing; the alert and wide-awake are realizing this fact and are guided by it.

The pharmaceutical education of to-day is the product of the work of a comparatively few minds. The education of the future should be the result of the af-

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[1] Dean Emeritus, University of Minnesota.

firmative working of many constructive minds, and should accordingly reach much more highly placed standards. The paramount objective is or should be the utmost advancement of the public welfare; that utmost contribution must be based upon a much higher and more altruistic, intelligent professional service, attainable only or primarily through higher education and more exacting training, than is standard now.

This body of men whom I am addressing, with a conviction gained and strengthened through a long life time, represents the collective mind, and each separate member the individual mind. I see a great potential power in you individually and collectively for the advancement of our profession; a power and influence far beyond those you are exercising now in a composite way. Upon you and others in related divisions of our professional activities, depends in a major degree what is to become of Pharmacy. I do not mean to accuse anyone of indifference; rather do I want to do you a service, such as I would have been grateful to have received when I was as young as some of you are. I want only to remind those to whom my remarks apply, or those who are willing to accept them, that every one of us is in a strategic position to exert influences and set examples leading definitely to a better general welfare through higher pharmaceutical standards. Many of us are doing that very thing in a well-thought-out way or method. Others just do an honest day's work and let it go at that. That isn't enough. Everyone of us should be an executive and have the interest and industry of an intelligent executive. Most of our minds are working at much less than full capacity. A good mind working at half capacity but with discrimination and wisdom, will far exceed in effective results the busy mind that works indiscriminately and without well-defined objective or plan. Not all of us can make detailed plans for the rest of our lives, but we can make plans in a general way. It is a good plan to make plans—worthwhile plans, of course. By doing so we can actualize things that we wish to come to pass. We plan with our minds. Our minds will work for us if we bid them do so, and direct and energize them.

I would like to put a thought into your individual minds for your own further individual development. It is already in the minds of a few of us. It has been in my mind for many years. I have spoken and written upon it many times. At first I had no adherents at all. During the past several years the number of supporters has grown measurably. *The thought is to develop pharmaceutical educational standards to a parity with those of other professions, especially with those of Medicine.* I would like to strengthen this objective by quoting what I said as the guest speaker at the Winnipeg meeting of the Canadian Pharmaceutical Association not long ago. "Advancements have ever had to fight their way against too conservative or uninformed or prejudiced minds and that is well, because development won against such opposition must have merit. The four-year course is not the end of the development begun with the abolition of the old-time two-year course. It is only a milepost; and beyond it is another milepost and then another in accordance with the law of civilization and human progress. There is nothing in history to prove that lower standards are in the long run better than higher, and civilization itself is proof that higher and ever higher standards are the plan for the increase and maintenance of the welfare and safety of mankind. The great mass

of the people does not think in large enough terms to realize this fact, and must be pushed forward by the comparatively few who do.

Progress is mental first of all. Let us follow out this thought somewhat: There is the individual mind and the collective. Great thoughts and projects arise in the individual minds who think in the larger terms. It is pioneering work on the part of the few to get new thoughts, ideals, projects, into the consciousness and acceptance of the group or collective minds. The higher the average of the common sense of the mass mind and of the smaller collective or group minds, the easier is the work. The average is not nearly high enough, but it is advancing perceptibly and is gaining momentum in an intellectual sense, and I believe in a moral one as well, as evidenced by recent development in practically all walks of life. The one great collective human mind concerns itself, or should, with matters common to all humanity. For matters not common to all humanity, there are divisions or group minds, collective or inclusive in their own spheres. Every social group has its own collective mind in this respect, including in its composition individual minds who are leading or educating the mass minds in matters common to the group. The various professions are examples of such groups or divisions of the collective mind. There are the group minds of Medicine, Pharmacy, Dentistry, Law, Education, Business, Mines, Engineering, Architecture, Art, etc. Each of these group minds thinks in its own terms principally. The medical group mind is different from the legal because it has medical and not legal things to think about and vice versa. Each of these social or professional groups has its own further subdivisions, and so, for example, medicine has smaller groups of specialists, each subgroup thinking in the terms of its subdivision, but in relation to the larger group. The pharmaceutical group mind has its subdivisions, some of which are: the educational (teachers and the colleges), the practional (practicing pharmacists), the regulative (the State Boards), the industrial (manufacturers), the distributive (wholesalers), etc. Each of these subgroups, like all such divisions, thinks in terms peculiar to itself and usually refuses to think, even remotely, or occasionally or partially, in the terms of the other divisions. And here I put my finger on a weak spot to which I will revert at another time.

For purposes then of what I am attempting to convey, let me classify: (1) the one great collective human mind; (2) the group minds or divisions of the collective mind; and (3) the individual minds. The individual minds are basic in their several aggregates to and constitute the group minds and through these the entire collective mind. All initiative is taken by the advanced individual minds, and in matters relating to or affecting the groups is or is not advanced by the group minds. The individual minds cannot, of course, do certain things, nor can the group minds. For example: all the proposals for higher pharmaceutical educational standards were made by individuals, but they could not actualize them. However, through the agency of the pharmaceutical group mind, which functioned at first through the A. Ph. A. and now operates also through other subgroups such as the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, the State associations, the various conferences, seminars, the Research Council, Council on Education, etc., most of the worthwhile and timely proposals made by individual minds have slowly become actualized. The individual minds propose; the group minds enact; that is, if they are convinced affirmatively. To

bring about this conviction is the difficult work. Even the most worthy proposals meet at once such obstacles as self-interest, prejudice, jealousy, indifference, ignorance, inability to think a matter out to its logical conclusion and other infirmities of individual minds. The struggle is first among the individual minds. When these minds agree, or a majority of them, enactment by the group mind follows and the agreement becomes a guiding principle for the group. The initial, basic, preparatory work is therefore with the individual minds. Work with the group mind follows. The enactments of the group minds relate to matters affecting only the respective groups. Group mind matters may be said to be of two kinds: (1) those relating exclusively to the group and (2) those relating to other groups. Similarly, individual mind affairs are (1) those pertaining to the self exclusively, and (2) those having to do with other individual minds. Group mind matters relating to other group minds bring the group minds into contact and agreement and sometimes into conflict. In all such matters the group minds, or a majority of them, must agree before they can produce any advancement, just as the individual minds have to agree in matters relating them to other individual minds before group mind action can be expected. Group minds must meet other group minds for agreement upon matters common to them all. The sum total of these matters in common constitutes the affairs of the one great collective human mind.

For a clearer understanding of what I am trying to convey we can exemplify: (1) The individual minds with the minds of individual citizens and with the minds of individual pharmacists; (2) The group minds with the minds of the state legislatures and with the minds of organizations; (3) The collective mind with the mind of Congress (as yet unorganized pharmaceutically).

There is therefore a universal mind relationship. From the closest to the remotest degree, every individual mind is related to every other individual mind and its life and affairs; to every group mind and its life and affairs, and to the great collective or mass mind. The collective pharmaceutical mind is as yet unorganized. Its organization into a federation representing all subgroup minds is Pharmacy's next important self-defensive measure. (I have frequently written about the need of a federation of all organized divisions of Pharmacy. Reiteration is not needed here, but all interested are referred to my papers and addresses published on the subject.)

Applying what has been said above, emphasis should be placed upon the need of directing and educating the individual pharmaceutical minds into channels of better thinking. Most individual minds are open to convinction and willing to be guided rightly by, shall I say, advanced individual minds? But the advanced minds are not sufficiently marshalled to do the needed work. As already stated, the individual minds must associate themselves into group and subgroup minds for purposes of enactment of agreement binding upon all thus associated. The various pharmaceutical organizations already represent in a respectable degree such association of individual minds, but the respective subgroup minds have not together sufficiently planned procedures for the further education of the individual minds for needed still higher enactments. The associations I named above are the organizations nearest to this needed planning and work, because they are so intimately related to education and education is most fundamental and basic as generally agreed. The work they have already accomplished bears out what I am advocat-

ing, only they should go further and accelerate their paces. It would be proper for these group minds to launch a well-planned and definitely directed movement toward generally higher educational and practitional standards and ideals of the individual minds. They would not be alone in so doing, because the group minds of other professions have already preceded them as shown by their respective higher standards of education and personnel. What the plans and procedures should be I have not now the time to indicate fully, even if I could; indeed the plans should be formulated by many minds, but they should include: (1) a study of the procedures already largely completed by other professions; (2) wiser selection of recruits for Pharmacy; (3) the education and correlation of the individual minds, especially of students and other recruits, specifically toward the realization and appreciation of the value, ethically and materially, of higher standards; and (4) the placing of a watchful keeper at the door to Pharmacy. My proposal to require the completion of the Junior College for entrance upon technical pharmaceutical study, though an important one, is only part of what a concerted plan should be. It is only another of the periodical suggestions made by an individual mind realizing the need of additional enactments, instead of the command of the organized pharmaceutical group mind presenting its mature conclusion after careful thought and investigation; but that is the way all advancements have been started in the past and probably must continue to be the way for a while longer.

Education is a development, a growth, an evolution; so are civilization, culture, human welfare. The latter depend upon the former and upon research. Education is fundamental and concerns itself first with the individual mind. Under adequate development of education, other things follow. Education is the cost of welfare. The more of the one, the more of the other. One is the cause, the other the result. These facts are quite generally accepted, and need no elaboration here, but it may be helpful to review some of the recent steps in pharmaceutical educational development, and I will devote a few minutes to that end:

In a paper read before the Section on Education and Legislation, A. PH. A., at the New Orleans meeting in 1921, entitled, "Higher Pharmaceutical Standards," and published in the October, 1921, issue of the JOURNAL OF THE A. PH. A., I predicted: "the next partial step in pharmaceutical education will be one year of academic college training above the High School as a prerequisite to the study of Pharmacy." That was seventeen years ago, and followed a paper read before the Conference of Pharmaceutical Faculties, and also before the joint session of the Section on Education and Legislation, A. PH. A., and the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties in 1918, entitled, "More Consistent Pharmaceutical Standards," and published in the September 1918, number of the JOURNAL OF THE A. PH. A. in which I urged the completion of a four-year High School training as the minimum preparation for the study of Pharmacy. I had made these and similar recommendations earlier but cannot at this moment give bibliographical references. These two recommendations have now been carried out, because the minimum four-year course, in effect in most colleges by action of the American Association of Colleges of Pharmacy, includes the equivalent of one year of academic work of college standard. These two recommendations were made as only part of a program I had planned for the College of Pharmacy of the University of Minnesota as long ago

as 1892, and which I always hoped would become the objective of Pharmacy in general. This developmental plan of pharmaceutical educational objectives included among other things the following steps successively in the order given:

1. Completion of four years of High School preparatory to pharmaceutical study.
2. Ditto, with subject requirements within the High School curriculum.
3. The abandonment of the two-year course, and the establishment of the minimum three-year course.
4. A minimum credit and clock hour content, a selection of proper didactic and laboratory subjects and their correlation and coördination, in the three-year course.
5. The completion of the first year of an Arts or Junior College either before or concurrently with pharmaceutical study, as part of a four-year course. (The now existing minimum four-year course.)
6. Ditto, with subject designation in the academic work. (For example: the required 45 academic quarter credits to include 10 credits of each—English, a foreign language and college Physics, and 15 credits of electives.) (The present minimum four-year course in the College of Pharmacy of the University of Minnesota.)
7. The completion of the first two years of an Arts or Junior College as a prerequisite to the study of technical Pharmacy, to constitute a five-year course.
8. Ditto, with designation of subjects to be completed within the Junior College curriculum.
9. The completion of three years of academic study preliminary to three years of technical pharmaceutical study. (Six-year course.)
10. The possession of a B.A. or B.S. degree from an accredited Arts College before technical study. (Seven-year course.)

The above program relates to undergraduate work. Graduate matters are on another program and need not be taken up here.

After nearly forty-seven years, the first six objectives of the program have been reached. The seventh objective is therefore next in order and should receive active attention and support by at least those colleges who are in position to look forward with some degree of certainty to its realization. Indeed, all colleges could support the objective, in principle at least. It will be the accepted standard sooner than many believe possible, because two very important factors are entering the situation: (1) Educational standards are rising acceleratingly everywhere and in all divisions of education. The professions represented in the leading universities have practically all achieved this objective or gone beyond it, either upon their own initiative or upon the initiatives of the university administrations. Anyway, Pharmacy is behind them in that respect and for no reason that would have any weight in the discussion of the responsibilities and relations to public welfare of the various professions. Some university administrations believe the completion of the Junior College is the lowest present educational standard that provides an adequate basis for professional study of any kind and they may soon act on that belief and enforce the requirement with or without the support of Pharmacy itself. Educational institutions, especially the higher ones, can no longer fail to realize that their full

and responsible relations, individually and collectively, are to public welfare, and many are including in that relationship a sense of duty to the general welfare not felt before in any compelling degree. It is indisputable that some calling themselves pharmacists are not sufficiently trained culturally and professionally to meet the demands and decrees of a professional standard in the sense accepted by other professions and demanded by public as well as individual welfare. Reasonable laws are not retroactive and no one now in practice should be made to suffer by retroactive laws, but it is clearly a duty to accept new recruits only on terms that are certain to improve present standards. The hope lies in the coming and future generations of pharmacists, but the present generation because it is in power is responsible in a large measure for the standards of the future. Its present standards are inadequate for the future. It can atone somewhat for its past mistakes and omissions by studying the past and applying its lessons to the future by aiding the modern trend and objectives of the higher institutions of learning. (2) Another element, also practically external to Pharmacy, is the demand for higher standards by students. This is well illustrated by the fact that practically fifty per cent of the students in the College of Pharmacy of the University of Minnesota have voluntarily completed the two years of the Junior College. A few have completed three years of academic work and several have the academic bachelor degree in arts or science. (These latter are in the vanguard and give promise of achievement in due time of objectives 9 and 10 in the above program.) These students have or will have completed five or more years for their bachelor's degree in science in Pharmacy and several years ago they petitioned the College for a degree indicating five years of work above the High School, or for the advancement of the degree requirement to five years. It is encouraging and heartening to be able to report such a demand on the part of students. There is an increasing number of students who are wise enough to look into the future and to plan their lives to meet more successfully the increasing competition in life which they can foresee. More and more students are seriously planning far into their futures. They are realizing that life is a great adventure and that adequate training is the best insurance against failure and for success. They plan in a high-minded way. In a measure they write their own specifications of what they want or think they should have. No faculty should discourage this tendency, but should be helpful with wise suggestions. Many modern students educate themselves. They choose to go to school only because the school affords them a means of expediting the attainment of their goals, just as a fast train brings one to a destination in a better way and in quicker time than the old gray mare could. However, it would never do to let the train decide the matter of our going any more than it would be wise to let the students alone decide what the educational policies and procedure should be, but their interests and helpfulness should be welcomed and encouraged. I cannot think of a more helpful sign for Pharmacy than a student demand for a five-year course, a "two and three" course; two years academic and three professional. Such a demand would point to the coming of a wiser and more loyal generation of pharmacists.

In conclusion, let me say that these two factors in pharmaceutical educational development should make us pause and study anew what our objectives should be in the light of the ever-increasing general development and to state these objectives in new or advancing terms. It is clearly within the scope, indeed within

the functions and duties of the group minds represented by pharmaceutical organizations to think on these matters and to formulate objectives and procedures. Not all of the group minds have as yet discovered themselves. In fact, some have no consciousness of their own existence. Some have and are working, though not according to a definite well-formulated plan. Others should be helped to discover themselves and to realize how much time they have lost. Who will help hasten the awakenings?"

At the University of Minnesota and at other comparable institutions, Pharmacy is behind Medicine, Dentistry, Education, Law, Agriculture, etc., in educational standards. The relation of these to the general welfare is no more responsible than Pharmacy. Pharmacy has lower standards because its members appear not sufficiently conscious of their rightful place in public health service in which Pharmacy's partitipation is on a par with Dentistry and most of the divisions of Medicine, if based on the responsibility these professions bear to public health. Another reason is the unaggressive and unadministrative attitude of the rank and file of the pharmacists.

The next step Pharmacy should take is to rise to the five-year minimum standard. The faculty of the College of Pharmacy of the University of Minnesota recommended this step to the President of the University three or four years ago. The matter is still under advisement. It is one of the objectives Dean Rogers is expected to advance. He needs encouragement and support. The Minnesota College had the encouragement of several other colleges when it was the first to go on the minimum four-year course in 1926. If other colleges look with expectant eyes on Minnesota again, the five-year course will eventuate all the sooner. The many arguments against every higher step advocated for Pharmacy in the past all proved unavailing in the end, because they were without inherent merit. The few arguments against the five-year course I have heard will prove similarly unavailing as will all those succeeding ones opposed to an educational parity of Pharmacy with Medicine. Some laggards should become workers forthwith. The records show that every recommendation I made during the past half century was at first declared visionary and impractical, but every one of them without exception has been enacted, and so will the five-year course and the still higher standards listed in my plan above.

The five-year course is not a new idea. I have been advocating it for a long time and others have supported it for years. As long ago as 1928 I received an unsolicited letter and to which I gave some publicity, in which the writer said among other things: "You are perfectly right in insisting Pharmacy has every right, indeed is obliged, to place its standards upon a basis already established by other and "no more responsible" professions. Proper education, including the cultural and ethical qualities that go with it, point the only way out of our present situation, and the only means for our rehabilitation and the return of our professional self-respect. You establish the five-year course and others who are hoping for it will be better able to increase their requirements."

Another correspondent wrote at about the same time: "As you say, Pharmacy is in all respects a division of Medicine, in fact the most important one, and should therefore be characterized by the same standards upon which our medical brethren insist."

Now if I wanted to quote you, my listener or reader, what would you say? I hope you wouldn't speak until you had given the matter a thorough study.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. PHARMACY SUB-SECTION PROGRAM.

A symposium on the vitamins with particular reference to their standardization will be held on Tuesday, June 20th, when the Association meets in Milwaukee, Wis. Two sessions of the pharmacy sub-section are planned. A number of outstanding workers in the field of vitamin research have already accepted a place on the program. Others who desire to present papers should notify the chairman of the program committee at an early date.

GLENN L. JENKINS, *Chairman Program Committee.*

NATIONAL CANCER INSTITUTE BUYS RADIUM.

The National Cancer Institute purchased radium valued at $200,000 the latter part of 1938. This supply will be loaned to hospitals and clinics for treatment of cancer. An institution that borrows the radium must take the responsibility of transporting it from the Bureau of Standards and back again for periodic testing, must store it properly while using it and must insure it against loss and damage. According to the Health Officer, personnel and equipment of the borrowing institution must meet standards equal to those established by the American Board of Radiology for the safe use of radium. Preference in use of the radium will be given to persons unable to pay for the treatment.

MEETING OF DISTRICT NO. 4 OF THE N. A. B. P. AND THE A. A. C. P.

The 13th annual joint meeting of District No. 4 met at the University of Michigan Union, Ann Arbor, Mich., April 13th and 14th. There were Round Table discussions by State Board Members and Faculty Members, during the first hours. These were followed by a Joint Meeting at which time addresses were made by J. L. Powers and S. H. Dretzka.

The following papers were presented: "The Relationship of State Board Examinations to Professional Education," Edward Spease; "The Relationship of State Board Examinations to Dispensing Ability," R. L. McCabe; "The Relationship of State Board Examinations and the Pharmacy Laws," M. N. Ford; "The Relationship of State Board Examinations and the Evaluation of Character," H. George DeKay; "The Desirability of State Board Control of Apprentice Experience and Restricting it to Experienced Pharmacists," C. C. Glover.

Mr. G. A. Moulton spoke on "Significance of National Health Program to Pharmacy," on Thursday, after which a tour of the University of Michigan Hospital Pharmacy, led by H. A. K. Whitney, was enjoyed.

On Friday the following papers were read: "A New Examination System in Colleges," C. J. Klemme; "Modifications of Written Examinations Suggested by Prerequisite Legislation," Edward Kremers; "State Board Examinations," J. D. Russell; "Controlling the Education and Licensure of Pharmacists in the Public Interest," R. P. Fischelis; "Drug Store Inspection, of What Should It consist," R. E. Terry.

At noon Jacob Sacks spoke on, "The Scope of Undergraduate Training in Pharmacology for Pharmacy Students." Later on the following were read: "Intra-, Inter- and Extraprofessional Activities of District No. 4 Members," L. H. Baldinger; "The Philosophy Underlying Continuation Study in Wisconsin," Edwin Boberg; "Materia Medica in the Colleges and for State Board Examinations," L. F. Jones; "Classification of Students," A. F. Markendorff.

AMERICAN COUNCIL ON EDUCATION.

The Twenty-second Annual Meeting of the American Council on Education will be held at the Mayflower Hotel, Washington, D. C., May 5th and 6th. The sessions are open to the public and a cordial invitation to attend is extended to any person interested in education. Throughout the meeting the Council will maintain in the lobby of the hotel an exhibit of publications and other materials related to its activities.

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1938–1939.

Office of the Secretary, 2215 Constitution Ave., Washington, D. C.

LETTER NO. 6.

March 24, 1939.

To the Members of the Council:

48. Report of the Auditor. Mr. W. A. Johnson, Certified Public Accountant, has submitted the following report:

"I have made an examination of the books and accounts of the AMERICAN PHARMACEUTICAL ASSOCIATION and of your report, as treasurer, for the calendar year 1938, and I hereby certify that the total cash and securities on hand at December 31, 1938 amounting to $235,576.10 is correctly stated.

All cash receipts have been traced to deposits in banks to the credit of the respective funds for which received, and all disbursements have been found evidenced by properly authorized voucher checks.

Cash on deposit has been reconciled with statements submitted by the banks as of the close of the year or verified by comparison with certificates of deposit.

Investment securities, having a face or par value of $179,100.00, have been verified by examination of the bonds or certificates.

State of Tennessee 4½% bond, $1,000.00, held by the Research Fund matured on July 1, 1938 and was redeemed. The amount received for this bond has not been reinvested.

During the year the "George and Lillian Judisch Memorial Fund" was created by a donation of $2,000 U. S. Treasury 2–⅞% bonds.

During the year the "Franklin M. Apple Fund" was created by donation of cash in the amount of $1,452.90.

Interest accruing on registered bonds and on coupon bonds has been properly accounted for on your report and has been deposited to the credit of the proper accounts in the depositories of the ASSOCIATION.

Records maintained by the secretary of the ASSOCIATION have been examined and transfers of funds from his account to that of the treasurer have been verified and found to be correctly stated."

The Treasurer's Report for 1938, which includes the following summary, will later be published in full:

COMPARISON OF FUNDS.

Current Fund:

	Dec. 31, 1937.	Dec. 31, 1938.
Deposit in Merchants & Newark Trust Co.	$ 2,490.27	$ 980.37
Deposit in Baltimore National Bank	4,745.25	146.52
Deposit in Baltimore Trust Co.	1,331.37	1,228.96
Total Current Funds	$ 8,566.89	$ 2,355.85

Permanent Funds:

Endowment Fund	$ 18,280.69	$ 18,818.82
Centennial	6,398.49	6,570.37
Ebert Legacy	9,555.58	9,908.08
Ebert Prize	1,033.34	1,062.09
Life Membership	34,552.51	34,944.01

Endowed Membership	129.05	261.69
Research	92,263.73	92,944.36
Maintenance Fund	584,696.72	594,184.40
Total Permanent Funds	$746,910.11	$758,693.82
Trust Funds:		
Wm. Procter, Jr.	$ 19,686.64	$ 20,090.89
J. P. Remington	1,355.16	1,366.42
F. B. Kilmer	3,041.25	3,123.75
Franklin M. Apple	.....	1,452.90
George and Lillian Judisch Memorial Fund	.....	2,000.00
Total Trust Funds	$ 24,083.05	$ 28,033.96

SUMMARY OF FUNDS.

Current Fund	$ 8,566.89	$ 2,355.85
Permanent Funds	746,910.11	758,693.82
Trust Funds	24,083.05	28,033.96
Total Funds	$779,560.05	$789,083.63

SUMMARY OF ASSETS AND TRUST FUNDS.

	Dec. 31, 1935.	Dec. 31, 1936.	Dec. 31, 1937.	Dec. 31, 1938.
Current Fund	$ 2,823.87	$ 32,760.06	$ 8,566.89	$ 2,355.85
Permanent Funds	688,369.23	698,548.76	746,910.11	758,693.82
Total Assets	$691,193.10	$731,308.82	$755,477.00	$761,049.67
Trust Funds	19,819.02	23,416.92	24,083.05	28,033.96
Total	$711,012.12	$754,725.74	$779,560.05	$789,083.63

SUMMARY OF DEPOSITS, SECURITIES AND PROPERTY.

Deposit in Merchants & Newark Trust Co.	$ 980.37	
Deposit in Baltimore National Bank	10,275.29	
Deposit in Baltimore Trust Co.	4,743.57	
Deposit in Maryland Trust Co.	40,576.87	
Securities in Baltimore National Bank	179,100.00	
Property in Washington, D. C.	553,407.53	
Total Deposits, Securities and Property December 31, 1938		$789,083.63

49. Time of 1939 Meeting. Motion No. 13 (Council Letter No. 5, page 181) has been carried with the following members voting: YES—Mi, Ch, La, Dm, Sw, Hi, Ke, Ro, Je, Li, Fi, Ck, Ga, Co.

50. Temple University Student Branch. Motion No. 14 (Council Letter No. 5, page 181) has been carried with the following members voting: YES—Mi, Ch, La, Dm, Sw, Hi, Ke, Li, Fi, Ck, Ga, Ro, Je, Co.

51. Election of Members. Motion No. 15 (Council Letter No. 5, page 181) has been carried, and applicants for membership numbered 337 to 437, inclusive, are declared elected.

52. Use of the Text of the N. F. VI. A request has been received from the York Hospital, York, Pa., to use certain titles from the N. F. VI in a Formulary to be used in the hospital. The request has the approval of the Committee on Publications with the recommendation that no charge be made.

(*Motion No. 16*) It is moved by DuMez that the York Hospital, York, Pa., be granted permission to use the text of the N. F. VI in a hospital Formulary with the customary acknowledgment and for value received.

53. Research Grant. Recently chairman Gathercoal submitted to the Committee on Laboratory with his approval, the following request from Dr. Bernard Fantus for a research grant:

"On behalf of the University of Illinois College of Medicine, I make application for a grant of $1,800 for the period from January 1, 1939 to December 31, 1939 to be expended as salary to Miss Hattie Dyniewicz and for such supplies as may be necessary to conduct research on the general subject of Dermatologic Medication, with special reference to (1) clinical comparison of various tars dissolved in chloroform, employed as pigments; (2) therapeutic value of various dyes applied as pigments; (3) the hydrogen-ion concentration of the skin lesions and the correct p_H of preparations to secure the best therapeutic results; (4) monobasic sodium phosphate dusting powder and lotion in fungus and occupational diseases of the skin; (5) "Cuticolor Preparations:" the clinical value of the various forms developed (JOUR. A. PH. A., October 1938); (6) titanium dioxide cuticolor preparations compared with those in which zinc oxide is used; (7) the study of the chemistry, pharmacology and therapeutics of ingredients largely used in cosmetic preparations; *i. e.*, triethanolamine, titanium dioxide, cetyl alcohol, absorption base, etc., with the thought that these preparations could advantageously be used in medicinal preparations.

It seems that the present development we have achieved in connection with the dermatologic clinics at the Cook County Hospital, which enable Miss Hattie Dyniewicz to secure clinical trial of new and improved preparations under competent scientific supervision, is one that should by all means be continued.

We have at present concentrated attention upon the clinical value of:

1. Colloidal Calomel Ointment; and
2. Calamine Lotions made with native and artificial calamines and the improved formula made with bentonite.

The study of the following additional items is now in progress:

3. Clinical comparison of various tars dissolved in chloroform, employed as pigments.
4. Therapeutic value of various dyes applied as pigments.
5. Triethanolamine; its value in dermatology.
6. The hydrogen-ion concentration of skin lesions and the correct p_H of preparations to secure best therapeutic results.
7. Monobasic sodium phosphate, dusting powder and lotion, in fungus and occupational diseases of the skin.

It is proposed to extend this study to include:

8. "Cuticolor Preparations:" the clinical value of the various forms developed (JOUR. A. PH. A., October 1938).
9. Titanium dioxide cuticolor preparations compared with those in which zinc oxide is used.
10. Development of skin varnish formulas so as to make possible the discontinuance largely of the use of ointments upon covered parts of the body.
11. The study of the pharmacognosy, chemistry, pharmacology and therapeutics of largely used ingredients in cosmetic preparations, *i. e.*, triethanolamine, titanium dioxide, cetyl alcohol, absorption base, etc."

The Committee on Laboratory has approved the request and now submits it to the Council with a favorable recommendation.

The amount proposed is to include the special gift for research of $1,000 and $800 from the income of the Research Fund.

(*Motion No. 17*) It is moved by Gathercoal that the request of Dr. Bernard Fantus as approved by the Committee on Laboratory, be approved by the Council. A vote on this motion will be called for in about ten days.

54. Applicants for Membership. The following applications, properly endorsed, accompanied with the first year's dues, and recommended by two members of the ASSOCIATION, have been received:

Nos.: 438, Joseph A. Ortolan, 600 Lafayette Ave., Brooklyn, N. Y.; 439, Ed. A. Kent, 411 Wilkinson Bldg., Omaha, Nebr.; 440, August E. Wilkoe, 36 Westview Ave., Tuckahoe, N. Y.; 441, Alfred J. D'Angelo, 2 Ardsley Rd., Upper Darby, Pa.; 442, Charles Foster Miles, c/o Effervescent Products, Inc., Elkhart, Ind.; 443, Aaron Heller, 100–20 159 Ave., Howard Beach, N. Y.; 444, Mark D. Croxton, 371 N. College, Auburn, Ala.; 445, Marvin C. Haynes, 4516 Harford Rd., Baltimore, Md.; 446, Murray Goldstein, 3924 7th Ave., Brooklyn, N. Y.; 447, Jack Ford, 606 Linden, Pullman, Wash.; 448, John F. Coghlan, 207 Norman Pl., Ocean Park Calif., 449, Russell T. Behrman, 618 S. Ashland, Chicago, Ill.; 450, Robert H. Sommer, 1310 S. Millard Ave., Chicago, Ill; 451, William Levine, 305 Broadway, Paterson, N. J.; 452, Matt J. Oehlberg, 4067A N. 14th, Milwaukee, Wis.; 453, Tidtaw Bunnag, 977 Tejo Rd., Bangkok, Siam; 454, Evertt A. Eyre, Jr., 50 Thomas Hall, Gainesville, Fla.; 455, Eric E. Cox, 50 Thomas Hall, Gainesville, Fla.; 456, Erich Meyer, 88 Lexington Ave., New York, N. Y.; 457, Walter Retzlaff, 201 Brower Ave., Rockville Center, N. Y.; 458, Irving Spaet, 140 E. 54th St., New York, N. Y.; 459, Abram R. Canter, 210 Stanwix, Pittsburgh, Pa.; 460, Frank W. Canedy, 630 12th St., Rock Island, Ill.; 461, Frederick T. Bradt, 805 S. Main, Almont, Mich.; 462, Edward L. Dassori, 4424 6th Ave., Brooklyn, N. Y.; 463, Julian H. Goldsmith, 1476 Irving Park Rd., Chicago, Ill.; 464, Joyce Johnson, 503 Campus, Pullman, Wash.; 465, Laura Lauritzen, 1703 Ruby, Pullman, Wash.; 466, Geraldine J. Stockert, 710 E. Pierce St., Council Bluffs, Iowa; 467, Ernest W. Aldredge, 223 Walton St., N.W., Atlanta, Ga.; 468, Ernest R. Jones, c/o Parke, Davis & Co., Detroit, Mich.; 469, George A. Hayes, Box 35, Prairie View, Texas; 470, James T. Richards, 505 Harris Ave., Austin, Texas; 471, William J. Schreiber, 4405—13th Ave., Brooklyn, N. Y.; 472, Eugene Ligetti, 76–21 Woodside Ave., Elmhurst, L. I., N. Y.; 473, J. E. Gasson, 118 N. Detroit St., Kenton, O.; 474, Saul Malasky, Morristown Memorial Hospital, Morristown, N. J.; 475, Edwin W. Miller, Route No. 1, Uniontown, O.; 476, Henry Colle, 670 Eighth Ave., San Francisco, Calif.; 477, Francis N. San Soucie, 78 Park St., Adams, Mass.; 478, Alfred A. Reinhardt, R. F. D. No. 2 Cambridge St., Plainfield, N. J.; 479, Sam J. Waddell, 11 Leland Ct., Chevy Chase, Md.; 480, Madeline O. Holland, 409 Old York Rd., Jenkintown, Pa.; 481, Vincent Bonkowski, 5623 Michigan Ave., Detroit, Mich.; 482, Maurice X. Benedict, 171 W. 41st Pl., Los Angeles, Calif.; 483, Joseph Cohen, 3210 W. Arthington St., Chicago, Ill.; 484, Mendel Nevin, 2923 Atlantic Ave., Brooklyn, N. Y.; 485, Nona M. Pickett, St. Anthony Hospital, Denver, Colo.; 486, Hyman Dickman, Hotel Roosevelt Phcy., Washington, D. C.; 487, William J. Whitson, 66 E. Main St., Phelps, N. Y.; 488, William J. Lenz, 1336 Storks Bldg., Louisville, Ky.; 489, Friedel C. Wilkening, 16543 Glastonbury, Detroit, Mich.; 490, Joseph A. Witt, 3917 W. Adams St., Chicago, Ill.; 491, Ernest E. Bartimmo, 183 Waverly Ave., Brooklyn, N. Y.; 492, Arthur S. Kollen, 19 W. Main St., Mt. Kisco, N. Y.; 493, Martin Adelmann, c/o Schimmel & Co., Inc., New York, N. Y.; 494, John E. Smith, c/o The Royal Jubilee Hospital, Victoria, Can.; 495, Eli Wilson, 60 Clarkson Ave., Brooklyn, N. Y.; 496, Venla Hyytiainen, Box No. 83, Sterling, Conn.; 497, Russell N. Field, W. Main Rd., Middletown, R. I.; 498, Anthony D. Picerelli, 4 Read St., Riverside, R. I.; 499, Leo R. Leduc, 328 Warren, Ave., E. Providence, R. I.; 500, Robert M. Smith, 32 McNiff St., W. Warwick, R. I.; 501, Basilio J. Mignacca, 269 Waverly St., Providence, R. I.; 502, Albert Rocco, 39 Walton St., Providence, R. I.; 503, Waldo E. Bishop, High St., Ashaway, R. I.; 504, Jean C. McCabe, 28 Centreville Rd., Apponaug, R. I.; 505, Leo B. Schretter, 358 Orms St., Providence, R. I.; 506, Mary C. Cardi, 1707 Cranston St., Cranston, R. I.; 507, Ray H. Smith, 3051 Pawtucket Ave., E. Providence, R. I.; 508, Dorothy L. Collins, 72 Wabun Ave., Providence, R. I.; 509, Coorken E. Chobanian, 549 Broadway, Pawtucket, R. I.; 510, Conrad E. Langevin, 86 Quincy Ave., Pawtucket, R. I.; 511, Leola Boynton, 50 Holyoke St., Brewer, Me.; 512, Orlando Buonanno, 192 Sterling Ave., Providence, R. I.; 513, Leo C. Clark, Jr., 100 Ridge Ave., Pawtucket, R. I.; 514, Keram M. Chobanian, 549 Broadway, Pawtucket, R. I.; 515, Steuart Merdinyn, 143 Cottage St., Pawtucket, R. I.; 516, Margaret Sharek, 646 Rockdale Ave., New Bedford, Mass.; 517, Phillip Earnshaw, 19 Gallup St., Providence, R. I.; 518, John Stadmick, 149 Liberty St., Pawtucket, R. I.; 519, John J. Barry, 20 Prince St., Pawtucket, R. I.; 520, Lawrence J. Bartley, 1040 York Ave., Pawtucket, R. I.

(*Motion No. 18*) Vote on applications for membership in the ASSOCIATION.

55. Rhode Island College of Pharmacy and Allied Sciences Student Branch. The following application accompanied by the membership applications and the dues for the signers together with the proposed Constitution and By-Laws, has been received.

"The undersigned students in the Rhode Island College of Pharmacy and Allied Sciences desire to establish a Student Branch in the College and petition the Council of the AMERICAN PHARMACEUTICAL ASSOCIATION to approve the establishment of the Branch and the Constitution and By-Laws as submitted.

Professor Vincent J. Fitz-Simon will serve as the Faculty Advisor to the Branch.

Venla Hyytiainen
Russell N. Field
Anthony D. Picerelli
Leo R. Leduc
Robert M. Smith
Basilio J. Mignacca
Albert Rocco
Waldo E. Bishop
Jean C. McCabe
Leo B. Schretter
Mary C. Cardi
Ray H. Smith
Dorothy L. Collins
Coorken E. Chobanian
Conrad E. Langevin
Leola Boynton
Lawrence J. Bartley
Orlando Buonanno
Leo C. Clark, Jr.
Keram M. Chobanian
Steuart Merdinjin
Margaret Shorek
Phillip Earnshaw
John Stadnick
John J. Barry

PREAMBLE.

WHEREAS, the advancement of pharmaceutical knowledge and the elevation of the professional status of pharmacists are objects to which we most heartily subscribe; and

WHEREAS, The AMERICAN PHARMACEUTICAL ASSOCIATION has for more than eighty years actively and earnestly labored on behalf of these purposes; and

WHEREAS, we approve of the work of the ASSOCIATION in this direction and believe that its efforts can be of great value to us as embryo pharmacists, and at the same time enable us in the future to discharge our responsibility in maintaining and furthering the same purposes;

Resolved, That we do hereby agree to constitute ourselves into such a student branch of the AMERICAN PHARMACEUTICAL ASSOCIATION and pledge ourselves not only to maintain its objects and principles but also to assist in every way possible to further elevate the practice of Pharmacy and to aid in the advancement of pharmaceutical knowledge. To such an end we adopt and accept the following Constitution and By-Laws.

CONSTITUTION.

ARTICLE I—*Name*. The name of this organization shall be the Rhode Island College of Pharmacy and Allied Sciences Student Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION.

ARTICLE II—*Purpose*. To further the aims and objects of the AMERICAN PHARMACEUTICAL ASSOCIATION by providing the students of Pharmacy an opportunity to know more about their chosen field and to be affiliated with an organization of high ideals and purpose.

ARTICLE III—*Members*. Any student actively enrolled in the College and who subscribes to this Constitution and By-Laws may be elected to active membership in the Branch.

ARTICLE IV—*Amendments*. This Constitution may be altered or amended by the affirmative vote of a majority of the active members of the Branch provided propositions to so alter or amend were submitted in writing at a preceding meeting.

BY-LAWS.

ARTICLE I—*Meetings*. The Branch shall meet at the College during each month of the College year and more frequently upon call of the officers of the Branch.

ARTICLE II—*Quorum*. Ten members shall constitute a quorum.

ARTICLE III—*Officers*. The officers of the Branch shall be a president, a vice-president, a secretary and a treasurer.

ARTICLE IV.—*Election of Officers*. The officers shall be elected by ballot at the first meeting of the Branch during each college year.

ARTICLE V—*Committees*. At the first meeting or as soon thereafter as possible, the president shall appoint the following standing committees and such other standing committees as may be provided for: Committee on Membership, to consist of three members; Committee on Professional Relations, to consist of three members. The president shall also appoint from time to time, such special committees as may be found necessary.

ARTICLE VI—*Amendments*. These By-Laws may be amended at any regular meeting of the Branch by the affirmative vote of a majority of the active members present and voting."

(*Motion No. 19*) It is moved by Little that the application to establish the Rhode Island College of Pharmacy and Allied Sciences Student Branch of the ASSOCIATION and the proposed Preamble, Constitution and By-Laws be approved. E. F. KELLY, *Secretary*.

PROCEEDINGS OF THE LOCAL AND STUDENT BRANCHES

ALABAMA POLYTECHNIC INSTITUTE STUDENT BRANCH.—The regular meeting was held on Monday evening, March 13, 1939.

Reporting for the Committee on Science and Practice of Pharmacy, Chairman Meigs discussed two new laws recently passed in Alabama, one removing certain items, including some drugs, from the list of sales tax exemptions; and the other statute The Fair Trade Law, regulating the retail price of drug store items.

The report of the committee appointed for the purpose of attending to the plans of the Banquet, was made by Mr. Pittman. It was voted that each member be assessed one dollar to cover the cost of the banquet and that the time, place and selection of the menu be left to the committee.

Mr. Thagard introduced the speaker for the evening, Mr. Albert Marshall, Assistant to the State Toxicologist, who gave an account of the work that the State Toxicologist has done on cases of intoxication from alcohol while driving automobiles. He also mentioned cases where barbiturates had been used with alcohol to produce intoxication and explained methods by which the degree of intoxication can be determined by the amount of alcohol excreted in the urine or from the content in the blood stream. President Hiller thanked Mr. Marshall for his very interesting lecture.

BEN EICH, *Secretary.*

CHICAGO.—The March meeting was held on Tuesday evening, the 21st, in the College of Medicine building. Present as guests were Mr. S. H. Dretzka, secretary of the Wisconsin Board of Pharmacy and Mr. E. C. Horn, president of the Milwaukee County Druggists Association, who addressed the Branch, briefly.

The address of the evening was given by Dr. Bernard Fantus who told of his work with the newer types of pharmaceutical preparations with especial emphasis on the Cuticolor formulas for external use. Pointing out that there is need of a skin colored vehicle for certain dermatologic medicaments, Dr. Fantus developed the entire series for practically any medicament which might be desired.

Among other topics discussed was the method of standardizing Tragacanth jellies according to the nature of the gum. Since not all samples of tragacanth are identical, varying amounts of the gum are needed to prepare uniform jellies. For measurement of the "gum strength," Dr. Fantus suggests the angle of flow over the time needed to reach a stable form or angle of repose as the expression of jelling abilities. Illustrations of this, with simple apparatus, were given.

In conjunction with the discussion of the use of tragacanth jelly bases, Miss Weston of Cook County Hospital told of the success obtained in treating cases of bed sores with Cuticolor Tragacanth Paste, which materially cut down time of dressing, cost of medicaments and hastened healing to a great degree.

R. E. TERRY, *Secretary.*

GREATER ST. LOUIS.—The meeting date was March 13th and the place St. Louis College of Pharmacy. The Secretary reviewed the meetings of the Branch from September to February inclusive.

The arrangements for the April meeting to which members of the American Chemical Society, the Alumni Association of the St. Louis College of Pharmacy and other scientific and professional organizations will be invited, were considered at length. It is planned to devote this get-together meeting to a discussion of problems of mutual interest; and it is hoped it will lead to similar gatherings annually. A feature will be a three dimensional film which will be shown through the courtesy of the Polaroid Corporation.

The promotion of attendance at the Branch meetings was also considered. A Committee on Attendance was appointed at the suggestion of Mr. Pauley, to personally control attendance of the members and others interested in the programs being presented.

FRANK W. MERCER, *Secretary.*

MICHIGAN.—The February meeting was held Tuesday evening, the 28th, in the Wayne County Medical Society Building, and was preceded by the usual excellent dinner.

President Ira Smith presided and after a brief business session Dean R. T. Lakey, chairman of the Program Committee, introduced Dr. Osborne A. Brines, a graduate in Pharmacy as well as Medicine and a member of the Department of Pathology of Wayne University College of Medicine and chief in charge of the laboratories of the Receiving Hospital, who discussed "Cancer Control." The talk was illustrated by many interesting slides showing the marvelous results obtained by proper treatment of the dread disease if diagnosed in time.

Dr. Brines said cancer is a much misunderstood disease and the general public seems to know only the dark side rather than that cancer is a treatable disease and in its earlier stages just as much so as any other major ailment. He said it was difficult to define a cancer other than as a tumorous growth of malignant nature. Animals and plants, too, are subject to this disease. While cancer is a disease of older people, children are not immune. Cancer never occurs in normal, healthy tissue. The recognized treatment for cancer is surgery, X-ray and radium. All advertised cancer cures whether they be salves, internal medicines, diet or faith healing should be avoided. In twenty-five years cancer has jumped from sixth place to second in causing death in this country, while tuberculosis has gone from first to seventh place. This indicates that public education is needed. A campaign on Cancer Control, he said, could save 50,000 lives yearly in the United States alone. He urged all pharmacists to take an active part in a campaign to correct the pessimistic viewpoint of the public regarding cancer, for until cancer can be talked about freely not much can be accomplished, and to educate the sufferer to seek the advice of the family physician at the earliest indication of a lump or tumor on any part of the body. Moles, too, are to be looked upon with suspicion, particularly the black mole. A general discussion followed, lead by Dean Lakey, J. H. Webster, R. L. McCabe and Isadore Trunk.

A rising vote of thanks was enthusiastically given Dr. Brines for his timely and interesting talk on a subject that is so vitally important to public health.

Mr. L. A. Seltzer read a communication acknowledging the receipt of a scroll drawn by the members of a committee appointed by the Michigan Branch in memory of Jerry McQuade.

BERNARD A. BIALK, *Secretary.*

NEW YORK.—The regular meeting was called to order at 8:45 P.M., Monday evening, February 20th, at the Columbia University College of Pharmacy. Vice-President Hauck presided and about one hundred and fifty members and guests were present. The minutes of the January meeting were approved as read.

Dr. Kidder, chairman of the Committee on Professional Relations, announced that as all were familiar with the work of the corresponding committees of the State Association and of the Council, there would be no need of reporting. Mr. Lehman, chairman of the Committee on Education and Legislation, read a report.

A letter from the New York Pharmaceutical Council was read. It solicited an ad to be used in a souvenir journal which the Council will publish in connection with the coming convention. The matter was referred to the Executive Committee.

There being no further business, the meeting turned to the Scientific Section with Mr. David Mason in charge, who expressed his thanks to Mr. Gustav Bardfeld for arranging the program.

The speakers included Mr. Frederick J. K. Ertel on "Clarification in Large Scale Manufacturing;" Mr. Francis X. Dealy on "Clarification and Filtration in the Pharmacy and Chemical Laboratory;" and Dr. Wilfred F. Ruggiero, who substituted for Dr. Cotui, on the "Preparation of Non-Pyogenic Infusion Fluids by Absorptive Filtration."

Various pieces of laboratory filtering apparatus were on display and at the conclusion of the meeting three pieces were donated to the Columbia College of Pharmacy by the Ertel Engineering Co. and the American Seitz Co.

After considerable discussion a rising vote of thanks was accorded the speakers and the meeting adjourned.

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The regular meeting was called to order at 8:45 P.M. Monday, March 13th, at Columbia University College of Pharmacy. President Canis presided and about one hundred and twenty-

five members and guests were present. Minutes of the February meeting were approved and the treasurer's report accepted. The chairmen of the standing committees being absent, their reports were omitted.

Under new business, Mr. Gustave Bardfeld rose to read portions of an article in *The Consolidated Pharmacist* which pointed out that under present Board of Health Regulations it is illegal to refill prescriptions or to fill prescriptions from copies, when they contain phenolbarbital, sulfanilamide, aminopyrine and many other commonly used drugs. Mr. Bardfeld urged that this prohibition be investigated and corrected. The president was directed to refer the matter to the New York Pharmaceutical Council.

There being no further business, the meeting turned to the Scientific Section. President Canis announced that Mr. Joseph J. L. Gavron, the scheduled speaker, had been called away and that his paper would be read by Mr. Wallack of the Abbott Laboratories. The paper discussed the history, preparation and uses of Vitamin K. At the conclusion of the discussion, a rising vote of thanks was accorded the speaker.

HORACE T. F. GIVENS, *Secretary.*

NORTHWESTERN.—With the collaboration of the College of Pharmacy and the Hospital Pharmacists Sub-Section of the Scientific and Practical Section of the Minnesota State Pharmaceutical Association, the Branch presented Dr. F. E. Schmidt of Chicago, Ill., in a lecture accompanied by motion pictures upon Pneumonia, Allergy and Liver Extract. The very interesting program occupied in excess of two hours. Chairman Fischer presided at the meeting which was held on March 17th, in the auditorium of the College of Pharmacy.

CHAS. V. NETZ, *Secretary.*

PHILADELPHIA.—The March meeting was called to order at 8:30 P.M. on Tuesday evening, March 14th in the auditorium of the Philadelphia College of Pharmacy and Science. The minutes of the February meeting were read and approved.

Dr. Osol, chairman of the Program Committee, reported that plans were completed for the April meeting and would include an address by Dr. John Reichel, director of the Laboratories of Sharp and Dohme.

Dr. Frank H. Eby, chairman of the Nominating Commitee, reported the committee's nominations as follows: *President*, Arthur Osol; *First Vice-President*, Arthur K. Leberknight; *Second Vice-President*, Dr. Herbert M. Cobe; *Secretary-Treasurer*, Rudolph H. Blythe; *Delegate to the House of Delegates*, Ambrose Hunsberger. Dean Griffith moved that the nominations be closed. This motion was carried and the presiding officer asked Dean Griffith to cast the ballot for the ticket as submitted. President-Elect Osol spoke briefly in accepting the presidency and in expressing his thanks for the confidence placed in him by his election.

The Branch was priviledged to hear as guest speaker on this occasion, Dr. Leon Lascoff, President of the AMERICAN PHARMACEUTICAL ASSOCIATION and distinguished retail pharmacist. President Lascoff delivered a highly interesting talk on "Professional Pharmacy." He discussed the importance of careful technique in compounding prescriptions and demonstrated the various results which are obtained by using different methods of mixing the ingredients in about thirty commonly encountered prescriptions. Dr. Lascoff's address was discussed by Messrs. Hunsberger, Griffith, Zonies and Nichols. A rising vote of thanks was accorded the speaker.

Immediately preceding the meeting the annual dinner to past-presidents was held in the museum of the College. Past-Presidents in attendence were: Pearson, Cook, Hunsberger, McNeary, Griffith, Goodhart, Nichols, Eby, MacLaughlin and Miller.

ARTHUR K. LEBERKNIGHT, *Secretary.*

RHODE ISLAND COLLEGE OF PHARMACY AND ALLIED SCIENCES STUDENT BRANCH.—The organization meeting was held on March 29th, with Professor Fitz-Simon, the faculty advisor, presiding. Mr. Bartley, temporary secretary, reported that the official charter for the Student Branch had been received from the AMERICAN PHARMACUEUTICAL ASSOCIATION and that the Branch was prepared to proceed with its permanent organization.

The Nominating Committee, consisting of Margaret Sharek, Dorothy Collins and George Bearlen, submitted the following nominees who were unanimously elected: *President*, Lawrence

J. Bartley, '39; *Vice-President*, Robert M. Smith, '41; *Secretary*, John Stadnick, '39; *Treasurer*, Leo C. Clark, Jr., '42. President Bartley expressed the thanks of himself and other officers for the honor done them and emphasized that the success of the Branch rested upon the charter members who had banded together for the promotion of Pharmacy.

The meeting was then adjourned until the evening when the members of the Branch joined with members of the Rhode Island Pharmaceutical Association in a reception to Dr. J. Leon Lascoff, President of the A. PH. A. It was memorable to meet the President and to have him present the official charter to the Branch in the presence of such a distinguished group of pharmacists who were also impressed by the occasion.

LAWRENCE J. BARTLEY, *Temporary Secretary.*

WESTERN NEW YORK.—The last meeting for the current year was held at the University of Buffalo on March 9th. Fifteen attended the dinner for the guest speaker and eighty-three registered for the meeting at 8:00 P.M. President Fiero called the meeting to order and introduced the new officers elected at the February meeting.

Dr. Lemon introduced Dr. W. A. Jamieson, director of the Biological Division of Eli Lilly and Co., who gave a very interesting, comprehensive and up-to-the-minute talk on "The A.B.C.'s of Biologicals." Dr. A. Wilmont Jacobsen, assistant professor of Pediatrics at the University of Buffalo and on the staff of the Children's Hospital and Dr. Ramsdell Gurney, associate in Medicine at the University of Buffalo and on the General Hospital Staff, were present to answer questions from the medical practitioner's viewpoint.

Dr. Jamieson said that the most effective and enduring immunity is acquired by having the disease. Since this is impracticable, much research effort has been spent in obtaining the desired artificial immunizing agent with minimum attenuation of the desirable factor but maximum sterility, concentration and purity. Because of the greater insolubility, and therefore slower rate of absorption, the alum precipitated toxoid is equivalent to twice the unit of toxoid and three times the unit of toxin—antitoxin. Dr. Jacobsen stated that most doctors preferred the toxoid because the precipitated toxoid occasionally formed sterile abscesses and very frequently produced a lump that persisted for from three to twelve months, either of which is hard to explain. Dr. Jamieson replied that the alum precipitated preparation was more stable at room temperature, and gave a prolonged immunity to adults working under conditions where tetanus infections are repeatedly encountered.

Each of the three guest speakers stated that sulfanilamide is successfully competing with and may completely replace the antisera now used for pneumonia. Dr. Jacobsen reported that by the administration of immunizing doses of scarlet fever toxin to all nurses the incidence at the Children's Hospital has been cut practically to zero. He considered this a real advance in the field. For immunity, five injections are required for children and eight to ten for adults.

Dr. Jamieson stated that the oral administration of biological preparations is about half as effective as subcutaneous injection but because more people will submit to oral treatment the per cent of the total population immunized is about the same by either method. Since the amount of the product administered must be about fifty times greater, the cost of oral administration is much higher.

Dr. Jacobsen and Dr. Gurney thought that Sauer's pertussis vaccine helps to prevent whooping cough; the cases are milder but an active case is probably not helped by it. For such things as the common cold and hay fever, more lasting immunity is obtained by repeated treatments over the entire year.

A general discussion followed at which the audience submitted written questions. Dr. Jacobsen, Dr. Jamieson and Dr. Gurney answered them.

President Schmitz announced that the Spring Clinic for the pharmacists of Western New York would be held at Foster Hall on the University Campus on April 11th and 12th.

MARGARET C. SWISHER, *Secretary.*

DONATIONS.

The AMERICAN PHARMACEUTICAL ASSOCIATION has received, for its Library and Museum, the following valuable donations, since the Minneapolis meeting.

Handsome Album entitled, "Chili Country of Beauty," donated by Mr. J. J. Nichols, Iodine Educational Bureau, Inc., New York City.

Ten books from the Historical Library of Dean Emeritus F. J. Wulling, University of Minnesota.

"The Chemical Essays of Charles William Scheele." Translated from Transactions of the Academy of Science at Stockholm with Additions, Lond. Printed for J. Murray, 32 Fleet St., W. Gordon and C. Eliot, Edinburgh, 1786. Presented by Mr. Fred West, San Francisco, Calif.

Copy of Jahr and Gruner's Pharmacopœia, 1850, presented by Mr. A. E. Mallard, Detroit, Mich.

"Council on Dental Therapeutics." Published by American Dental Association, Chicago, Ill.; presented by Dr. Harold L. Hansen, Secretary.

"First Principles of Chemistry," by Benjamin Silliman, 1849; and "The Dispensatory of the U. S. A.," by George B. Wood, fifth edition, 1843. Both presented by Mr. A. L. Suter.

Hot water bottle, presented by Miss Sarah Schaffer, Baltimore, Md., through Mr. A. N. Hewing. The bottle was brought from Germany by Miss Schaffer's great-grandmother; is over 150 years old.

Mrs. John G. Godding, Newton, Mass., presented a number of old pictures.

Mr. George Judisch, of Ames, Iowa, presented, "Lehrbuch der Exanthematischen Seifmethode," by John Linden, 1879; an old-fashioned instrument for pricking the flesh; and "Handbook of Therapeutics," by Sidney Ringer, 11th edition, 1886.

Boroughs Wellcome & Co., of London, England, presented six reprints. Nos. 251–256.

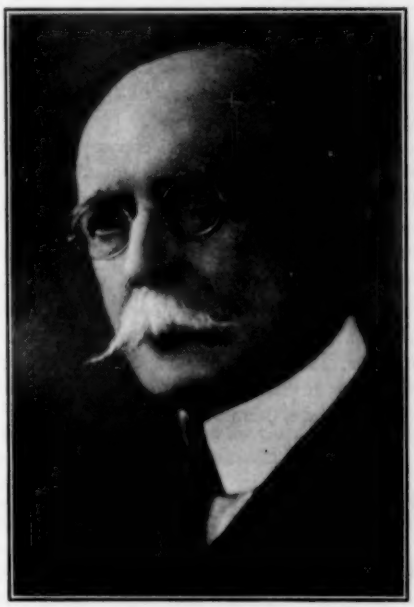
Mr. Claude C. Cannon, Charleston, S. C., presented, Contribution from the Charleston Museum, "Apothecaries Hall."

Mrs. H. M. Whelpley donated the Prussian Pharmacopœia, third edition, Berlin, 1813; Bates' Dispensatory, fifth edition, by William Salmon, M.D., published from the last Latin copy published by James Shiption, 1720; and a Scrap Book of 1880 to 1887.

OBITUARY.

BENJAMIN T. FAIRCHILD.

Benjamin Thomas Fairchild, president of Fairchild Brothers & Foster, died March 25th of a fractured skull suffered in a fall in his home in Greenwich, Conn. He was born the son of Thomas B. Fairchild and Susan Fairchild at Stratford, Conn. He graduated from the Philadelphia College of Pharmacy in 1872 and entered service in the pharmacy of Caswell, Hazard & Co.



Courtesy of Oil, Paint and Drug Reporter.

In 1878 Mr. Fairchild organized the manufacturing pharmaceutical company of Fairchild Brothers with his brother Samuel W. Fairchild, and subsequently a corporation was formed by the admission of Macomb G. Foster.

B. T. Fairchild was a horticulturist. He was treasurer of the Orange and Dutchess Garden Club, and a member of the Bedford (N. Y.) Garden Club, New York Botanical Garden, Garden Club of America, Brooklyn Botanical Garden and the Union League, New York. He affiliated with the AMERICAN PHARMACEUTICAL ASSOCIATION in 1875 and was its senior member at the time of his death.

Samuel W. Fairchild announced the Fairchild Pharmaceutical Scholarship in Great

Britain and Ireland in 1904 and at the San Francisco meeting in 1915 a scholarship of the same value ($300) for the United States, and this value was increased to $500, effective in 1929, and continued annually.

Surviving are a sister, Miss Myrtis V. Fairchild of Stratford; two nephews, Benjamin T. Fairchild of Cold Spring Harbor, L. I., and William S. Fairchild of New York; and a niece, Mrs. Henry W. Butler of New York. Mrs. Fairchild died in 1920.

EUGENE VON HERMANN.

Eugene Von Hermann, eighty-four years of age, druggist for more than fifty years, died March 14th at his home in Chicago. He had been a member of the AMERICAN PHARMACEUTICAL ASSOCIATION since 1917. He was also a member of the Chicago Veteran Druggists' Association, and had been a member of the Chicago Retail Druggists Association for thirty years, and was one of the best known druggists in the city.

Mr. Von Hermann is survived by a son, Edward, owner of drug stores in the Hotel Sherman and the Conway Building; and a daughter, Mrs. Stewart A. McHie. Services were held at St. Mary's Church with burial in St. Boniface Cemetery.

PERSONAL AND NEWS ITEMS.

In March there were shown in the Fordham College of Pharmacy, to the students in the class of Physiology, and invited guests, motion picture films of the development of normal and cancer cells.

The showing of the films, which lasted about one hour, was accompanied by lectures by Dr. Samuel Binkley and Dr. William J. Hoffman representing the New York City Cancer Committee of the American Society for the Control of Cancer. Drs. Binkley and Hoffman discussed preventable cancer, the danger signs of cancer and the various types of cancer.

Booklets on the "Prevention of Cancer" written by the nationally known authority on cancer, Dr. James Ewing, were distributed at the lectures, free of charge.

On Thursday, March 30th, Maryland pharmacy assembled to do honor to **Dr. R. L. Swain**, the new editor of *Drug Topics*. The scene of the dinner was the Southern Hotel, Baltimore. Among the speakers were Senator Millard E. Tydings, of Maryland; Dr. A. G. DuMez, dean of the Maryland University School of Pharmacy; and Aglar Cook, president of the Topics Publishing Co., publisher of *Drug Topics*. Dr. E. F. Kelly, Secretary of the AMERICAN PHARMACEUTICAL ASSOCIATION, was toastmaster. Hundreds of letters and telegrams were received by *Drug Topics* concerning the appointment of Dr. Swain, all bespeaking "the right man in the right place."

So numerous were the positions held by Dr. Swain that it took about three hours for representatives of universities, colleges, druggists' associations, state and Federal agencies and retail merchants' associations to bid him good wishes in his new position. Dr. Swain was presented with a chest of silver and several silver plates as a token of appreciation and esteem.

The anniversay of the blizzard of 1888 was observed by the Columbia Pharmacy graduates of that year in a dinner meeting at Hotel Dauphin on March 12th. This year the class of 1889 was invited to join with 1888 in forming a group which was composed of those graduating fifty or more years ago. In 1940 the class of 1890 will be included. Dr. J. Leon Lascoff, president of the A. PH. A., spoke of the demands that advances in pharmaceutical education have made upon the college.

The School of Pharmacy, Medical College of Virginia, Richmond, Va., acted as host to the American Society of Bacteriologists and Pathologists when it met in Richmond April 5th–7th. Dr. Frank L. Apperly, professor of Pathology, was chairman of the committee on arrangements.

The 9th Annual Druggists' Business Conference of Purdue University, was held on March 21st and 22nd, in the Memorial Union Building. Details of the Program appeared in our February JOURNAL.

Dr. John P. Snyder has resigned as Chief Chemist of the Norwich Pharmacal Co. to enter the field of private practice as Technical Advisor to the pharmaceutical industry of America. Dr. Snyder's long experience has qualified him for the work he is undertaking.

The Second Annual Spring Clinic of the University of Buffalo School of Pharmacy was held Tuesday and Wednesday, April 11th and 12th. The two-day clinic, which con-

sisted of a series of lectures, demonstrations and round-table discussions of professional and commercial Pharmacy, was sponsored by the Pharmacy School and the Alumni Association.

Hundreds of civic and business groups will observe the 18th annual National First Aid Week, May 21st to 27th, in connection with the National Association of Retail Druggists, its sponsors, when they picture the life-saving and injury-mitigating importance of first aid principles. Extensive committee plans embrace first aid dissemination in schools, churches, women's clubs, children's groups and other organizations where programs and demonstrations will illustrate the use of first aid principles. Drug stores throughout the nation will act as headquarters for first aid information.

Prof. Marvin J. Andrews, of the University of Maryland College of Pharmacy, was inducted into honorary Alpha Zeta Omega membership at the regional board meeting of the pharmaceutical fraternity at the Lord Baltimore Hotel, Baltimore. Eight students at the college also became members.

Dr. William Simon, a professor of Chemistry at the University of Maryland a score of years ago, was the first man in the United States to investigate the possibility of color photography.

The outstanding feature of the annual banquet of the Baltimore Retail Druggists' Association held recently, was the presentation of an oil portrait of **Dr. E. F. Kelly,** Secretary of the AMERICAN PHARMACEUTICAL ASSOCIATION, to the School of Pharmacy, University of Maryland. The portrait was painted by Mrs. Harry R. Rudy, of Hagerstown, presented by Dr. R. L. Swain, Deputy State Food and Drug Commissioner of Maryland, and accepted by Dr. A. G. DuMez, Dean of the School of Pharmacy.

Theodore Christianson, former Governor of Minnesota, and former member of Congress from that state, has been added to the staff of the N. A. R. D. in the capacity of Public Relations Counsel.

The Cincinnati College of Pharmacy is sponsoring a series of evening lectures in Pharmacy and allied subjects in conjunction with the Cincinnati Academy of Pharmacy. The purpose of these lectures and discussions is to acquaint practicing pharmacists with the newer developments in the field.

At the February meeting of the Academy, Prof. E. H. Plogman addressed the group on "Prescription Problems." He discussed particularly the incompatabilities of the newer pharmaceuticals and the use of modern materials such as modern sterol ointment bases, new solvents, iso-alcoholic elixir, etc., at the prescription counter.

The March meeting was in the hands of Dr. Melvin W. Green, who discussed "Biochemistry and Its Relation to Pharmacy." Dr. Green laid particular emphasis on the vitamins, explaining the varied and vague symptomology as the result of the function of many of the vitamins in the intimate metabolism of all cells.

Future meetings are reserved for Dr. J. F. Kowalewski, who will speak on the contributions of the physical chemist to Pharmacy, with a specific and practical discussion on isotonicity and p_H. Mr. Charles F. Henke, Jr., the Registrar, will discuss the classification of some of the late nonofficial remedies.

At the Tenth Pan-American Sanitary Conference held in January a resolution was adopted that all Latin-American countries which do not publish pharmacopœias of their own make the Spanish edition of the U. S. P. their official standard, and a commission has been appointed in Peru to study the subject and to make recommendations for the action of that country in this connection.

The American Chemical Society held its annual meeting in Baltimore, Md., April 3rd to 7th, with headquarters in the Lord Baltimore Hotel. Most of the meetings were held in the Fifth Regiment Armory. Dr. John C. Krantz, Jr., of the School of Medicine, University of Baltimore, was in charge.

The National Academy of Science held its 1939 meeting in the National Academy of Science Building, 2101 Constitution Ave., Washington, D. C., April 24th and 25th. Among the papers presented was one by Prof. August Kroh, of Copenhagen, Denmark, on "The Active Uptake of Ions by Organisms," and Sir William Bragg, from the Royal Institution, London, England, "History in the Archives of the Royal Society."

Eli Lilly & Co., Indianapolis, Ind., acted as host during the first week of April, to the graduating class of the School of Pharmacy of the University of Maryland. Dr. Marvin J. Andrews and Dr. Frank J. Slama, professors at the University, accompanied the students.

Dr. George Wald, instructor in Biology in Harvard University has been chosen by the American Chemical Society for the Eli Lilly & Co. award in Biological Chemistry. **Dr. L. S. Palmer,** professor of Agricultural Biochemistry in the University of Minnesota, has been selected for the Borden Company $1000 award.

When customers at the new Complete Prescription Pharmacy, 327 N. St. Paul St., Dallas, Texas, have to wait for prescriptions, they are made comfortable in the lobby where an eighty-year-old metal mortar serves as an ash tray. The prescription department is partitioned off by a wall made of Owens-Illinois glass bricks. H. S. Austin, owner of the store, which operates a strictly professional pharmacy, estimates that the store carries 7000 items. It employs twelve persons.

BOOK NOTICES AND REVIEWS.

A Treatise on Pharmacy for Students and Pharmacists, by CHARLES CASPARI, JR., late Dean and Professor of Pharmacy in the School of Pharmacy of the University of Maryland; revised by E. F. Kelly, Advisory Dean and former Professor of Pharmacy in the School of Pharmacy of the University of Maryland. This is the eighth edition of this well and favorably known book on Pharmacy, the text of which is devoted to general and practical Pharmacy and covers the pharmaceutical processes. The subjects of the Treatise are arranged under two headings—Part I deals with General Pharmacy—a study of pharmaceutical standards, the physical constants, etc. Part II is devoted to Practical Pharmacy. It includes the study of the preparations in their various applications, answering questions of importance as they come up in the practice of Pharmacy.

Dr. C. O. Lee, of Purdue University, rendered great service in this revision, offered valuable suggestions and read manuscript and proof.

The publishers are Lea & Febiger. Including the Index there are more than 550 pages, bound in cloth. Price, $6.50. The illustrations are clear and well selected for the purposes of the study. Condensing and deletions have reduced the size of the book by about 400 pages from the preceding volume and made readier reference possible. The authors have, no doubt, found that this method of arrangement of the text has many friends. The groups and classification have been checked and while there may be errors, none were found in glancing over the pages for this notice.

The reviser, to a certain extent, has taken up the revision of the book as a tribute to his teacher and co-worker. This writer prepared a prior review along related lines, therefore further comment would largely be repetitious, except for favorable mention of the work of the printers and binders.—E. G. EBERLE.

The Vitamins and Their Clinical Application, by PROF. DR. W. STEPP, University of Munich, Doz. DR. KÜKNAU, Wiesbaden and DR. H. SCHROEDER, University of Munich. Printed and bound by the Wisconsin Cunes Press, Inc. 173 pages.

A brief manual, translated by Herman A. Bouman, M.D., on vitaminology. It has been written especially for the busy man who has found literature on the subject difficult to assemble and to clinically apply. The authors are veterans in the field from the standpoint of the chemistry of development and of clinical application.

In the beginning of this manual is given a tabulated survey of the vitamins known to-day with short introduction to the historical development, terminology, relation to hormones, vitamins as foodstuffs and as curative substances.

Vitamins A, B, C, D, E and H are given separate chapters. Under vitamin A, which is given seventeen pages, a discussion of manifestation of deficiencies, requirement of man, metabolism as related to pure, isolated vitamin A, clinical observations and application, and vitamin A, dosage. A total of thirty-eight pages deals with vitamin B and its complexes. Several pages are given to the clinical discussion of this vitamin. Each of the vitamins is discussed with relation to their history, chemistry, determination, occurrence, clinical application and requirement of man.

Two very attractive features of this manual are noted. It is without doubt one of the most lucid books on the subject of vitamins that can be found. Further, it is rich in bibliographies. After each chapter there are a large number of references for the vitamin under discussion. In the back of the manual there are thirty-six pages containing bibliographies of vitamins A, B, C, D, E, F and G.

In the appendix the vitamins are outlined briefly as to apparent function, possible results of deficiency and results of absence.—EMERSON C. BEELER.

ATLANTA CALLS.

Among the entertainment highlights under consideration by the convention committee selected to arrange for the comfort, entertainment and enlightenment of delegates and visitors from every nook and corner of the nation expected to attend the 87th annual convention of the AMERICAN PHARMACEUTICAL ASSOCIATION, to be held at the Biltmore Hotel in Atlanta, Ga., August 20th–26th, are: A visit to a cotton mill, sightseeing trips to the many interesting and historical points in and around Atlanta, a banquet and party to be staged at the Piedmont Driving Club, Atlanta's society center, a real old-fashioned Georgia barbecue in the gardens of the Biltmore Hotel, a musicale comprising Southern melodies, possibilities of hearing the famed negro Big Bethel Choir and a Cotton Ball.

Apart from their business sessions visiting ladies will have few leisure moments judging from the tremendous interest and activity being manifested by the ladies of Atlanta and Georgia. A quick peep at the plans in progress reveal several luncheons, teas, bridge parties, a garden party with Margaret Mitchell of "Gone with the Wind" fame as the central figure, sightseeing tours, musicales and participation in special features provided for the general convention.

The business sessions will run daily throughout the convention week and will be of intense interest, not only to the attending pharmacists but to the entire world of Pharmacy. Secretary Kelly, group chairmen and officers, are busily engaged in the development of business programs which will be announced at a later date.

INTERNSHIPS IN PHARMACY.

Several years ago, Dean Spease, School of Pharmacy, Western Reserve University, made a valuable contribution to pharmaceutical progress in arranging with the University Hospital that a member of his graduating class be accepted as an intern. The graduate chosen spent the year of internship in residence in the hospital in close association with other interns, the working hours in the hospital pharmacy, and the broad experience gained during the year gave him a highly specialized training in this important branch of Pharmacy. Each year another hospital pharmacist has been added to the growing list of those interested in this branch of the profession. It is encouraging to see that the plan is now being adopted in other schools and hospitals. Temple University, Philadelphia, has arranged for an internship and very recently the Johns Hopkins Hospital, Baltimore, has announced that internships in Pharmacy will be open to two 1939 graduates of accredited schools of Pharmacy, as follows:

"These internships will be for a period of twelve months, beginning on July 1, 1939. Maintenance during this period will be provided by the hospital. It will be necessary for interns to occupy quarters in or near the hospital, as supplied. Off-duty hours must be so arranged that one pharmacist-intern will be on call when the hospital pharmacy is closed. An allowance of $20.00 per month will be made for necessary outside expenses for each intern. Regulations regarding personal conduct and habits will be those established by the Director of the Hospital for interns on other hospital services.

Opportunity will be offered for well-rounded practical experience in hospital manufacturing and dispensing procedures under capable supervision. Eight registered pharmacists are included in the full-time staff of the Pharmacy Department of this institution. All drug products and laboratory reagents used in the various clinics and out-patient departments of the hospital are supplied through the hospital pharmacy. The facilities of the Welch Medical Library are available for pharmacists who may wish to continue study during internship."

It is hoped that appointment of interns in Pharmacy will be increased to such number as will supply requirements. It will also be helpful if those who have held internships should go into pharmacies outside of hospitals.—E. F. K.

ROY BIRD COOK.